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MAR. 2013

Moisture Analyzer Instruction Manual

MOC63u

Uni Bloc®

Read the instruction manual thoroughly before you use the product. Keep this instruction manual for future reference.

SHIMADZU CORPORATION
KYOTO JAPAN
ANALYTICAL & MEASURING INSTRUMENTS DIVISION

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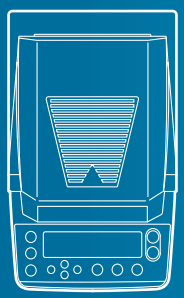
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Requests

- If you lend or transfer this product to others, attach this instruction manual to the product.
- If you lose or damage this instruction manual, contact your Shimadzu sales representative immediately.

Remarks

- The information in this instruction manual is subject to change without notice for the purpose of improvement.
- All information in this instruction manual has been carefully verified to ensure its accuracy. Any errors or missing information, should any be found, may not be corrected immediately.
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- Company names, organization names, product names, etc. in this document are the trademarks or registered trademarks of their respective owners.
- The Company does not guarantee that Windows Direct Function can run normally on all personal computers. The Company is not responsible for any problems caused by this function.

Introduction

Thank you for choosing the MOC63u, Shimadzu Moisture Analyzer.

Shimadzu Corporation, with more than 90 years experience in manufacturing high precision balances, is confident in the high quality of the MOC63u moisture analyzer. The MOC63u provides prompt and accurate measurement of moisture contents. With the full adoption of UniBloc® cell, which we started to use for electronic balances in 1989, the MOC63u also features improved reliability. The cross key dedicated to menu manipulation has improved the operability of the MOC63u, making it easier to use.

The MOC63u is also equipped with the Windows Direct Function that can transmit measurement results to a PC without requiring any software to be installed, as well as other various functions that users can use conveniently according to their aims.

To make full use of the performance and functions of the MOC63u moisture analyzer, please read this instruction manual carefully, and follow the usage instructions. Please keep this instruction manual with the product, so that you can refer to the manual at anytime necessary.

You can download the instruction manual (PDF format) from our web site (http://www.shimadzu.com/an/balance/index.html).

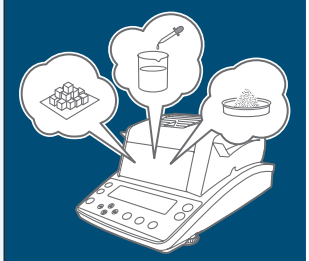
For information on the following points, please contact your Shimadzu Balance representative.

- Product warranty
- After service

What You Can Do

You can search the usage instructions for information about functions you want to try or learn about by aim.

Various measuring methods



- I want to measure moisture content!
  Measuring Moisture Content ➡ page 44
- I want to set measuring conditions in detail!
  Setting Measuring Conditions ➡ page 52
- I want to measure data easily!
  Standard Drying Automatic Ending Mode ➡ page 53
- I want to measure data by setting the time!
  Standard Drying Timed Ending Mode ➡ page 55
- I want to measure samples that change largely with heat!
  Slow Drying Mode ➡ page 58
- I want to measure liquid samples!
  Rapid Drying Mode ➡ page 56
- I want to measure the amount of change in moisture content at different temperatures!
  Stepped Drying Mode ➡ page 60

For accurate measurements



- I want to measure data accurately with the moisture analyzer!
  Calibrating Moisture Analyzer ➡ page 73
- I want to span calibration of the moisture analyzer!
  Span calibration ➡ page 73
- I want to calibrate the temperature of the moisture analyzer!
  Calibrating the Temperature (*1) ➡ page 73

(*1) The temperature calibration kit (option) is required.

Outputting measurement results and settings



- I want to transfer the measured data to PC (Excel, etc.)!

Using Windows Direct Function ➡ page 79

- I want to set the ID for each moisture analyzer unit to control several units!

Setting the Moisture Analyzer ID ➡ page 72

- I want to set sample codes for the moisture analyzer to control samples!

Setting Sample Codes ➡ page 67

- I want to set the date and time for the moisture analyzer to control the measurement date and time!

Setting the Date and Time ➡ page 68

- I want to print out measurement results!

Printing Stored Measurement Data ➡ page 93

- I want to print out the settings!

Outputting the Moisture Analyzer Settings from a Printer ➡ page 94

Others

- I want to switch types of values to be referenced for measurement!

Setting the Measurement Standard ➡ page 63

- I want to restrict menu items to be displayed!

Restricting the Menu Display ➡ page 69

- I want to set the password!

Setting the Password ➡ page 70

- I want to clear measurement data from memory!

Clearing Measurement Data from Memory ➡ page 105

- I want restore the default settings of the moisture analyzer!

Initializing Moisture Analyzer Settings ➡ page 106

Safety Notes

Be sure to follow the safety guidelines

To use the moisture analyzer safely and properly, carefully read and observe the following safety guidelines.

The levels of danger and damage that will arise if the moisture analyzer is used incorrectly are classified and indicated as shown below.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.

Precautions are classified and explained by using one of the symbols below, depending on the nature of the precaution.

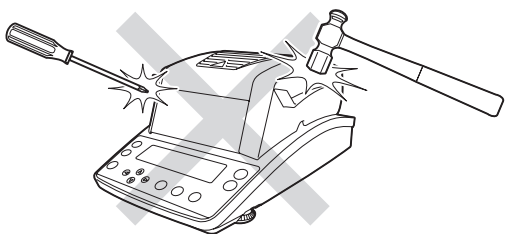
Instructions	Indicates an action that must be performed.
Prohibitions	Indicates an action that must NOT be performed

⚠ WARNING

Prohibitions

Never disassemble, remodel, or repair this product and accessories.

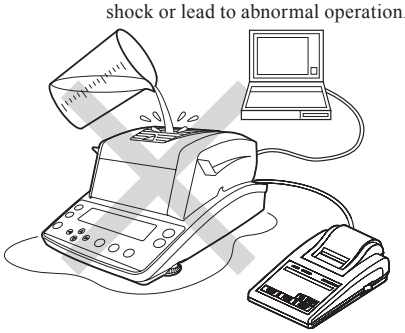
Doing so may result in an electric shock or lead to abnormal operation.
If you believe the moisture analyzer may be malfunctioning, contact an authorized Shimadzu representative.



Prohibitions

Do not use the moisture analyzer and peripherals (Connected PC or Printer) outdoors or in a location where it can be splashed with water.

Doing so may result in an electric shock or lead to abnormal operation.



Instructions

Use the moisture analyzer with the specified power source and in the specified voltage environment.

Using the moisture analyzer with an inappropriate power source or voltage level may result in fire or malfunction.
Also note that the optimal performance may not be achieved when power source or voltage is unstable, or power capacity is insufficient.

Instructions

Ground the product.

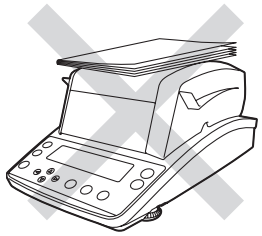
To prevent electric shock and to maintain stability in operation of the product, be sure to ground the product.
The product will be grounded when its power plug is inserted into a 3-wired power socket equipped with a ground terminal.

⚠ WARNING

Prohibitions

Do not place anything on top of the heater cover.

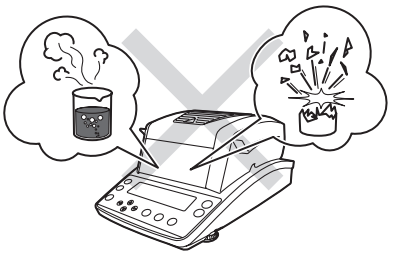
Doing so may result in fire.



Prohibitions

Do not attempt to measure samples that may undergo dangerous chemical reactions when heated.

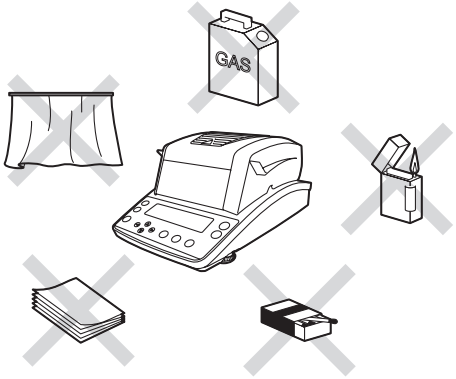
Doing so may result in an explosion or release of toxic gas.



Prohibitions

Do not place flammable materials near the moisture analyzer.

Some parts of the moisture analyzer become extremely hot during operation and could cause a fire if flammable materials are placed nearby.



⚠ CAUTION

Prohibitions

Do not touch the heat-dispersing component of the heater cover or sample pan with your bare hands during and immediately after measurement.

Doing so may result in burn injury.
This moisture analyzer is extremely hot during and immediately after measurement.
When touching the moisture analyzer, only use the specified control knobs and accessories.



Prohibitions

Do not place any non-heat resistant objects near the moisture analyzer.

Some parts of the moisture analyzer become extremely hot during operation and could lead to damage or deformation of non-heat resistant objects.

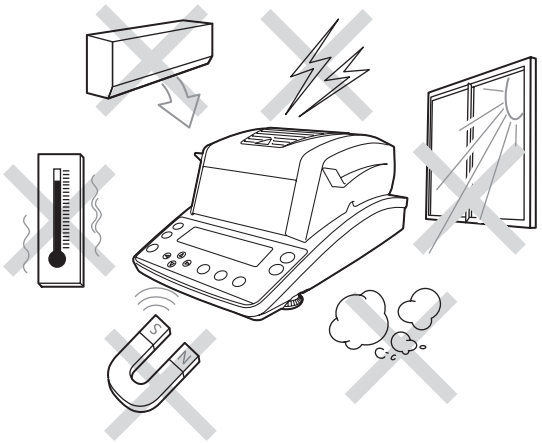
⚠ CAUTION

Prohibitions

Do not use the moisture analyzer in the following locations:

Doing so may result in a malfunction.

- Where there is an air flow (near an air-conditioner, air vent, door, window, etc.)
- Where temperatures change markedly
- Where vibrations occur
- In an area exposed to direct sunlight
- Where corrosive or inflammable gases are present
- Where dust, electromagnetic waves, or magnetic fields are present



Prohibitions

Do not use the moisture analyzer as a proof of transaction.

The law does not allow the moisture analyzer to be used for proof of transaction such as medical preparation.

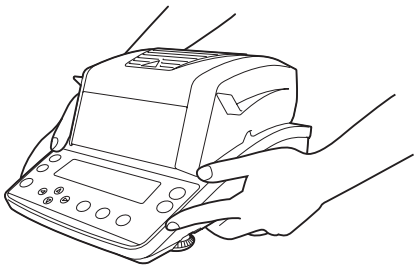
Instructions

Handle the moisture analyzer carefully.

The moisture analyzer is a precision device. Subjecting it to impact may result in a malfunction.

When moving the moisture analyzer main unit, securely hold it with both your hands.

If long-term storage is required, use the original package box to pack the product.

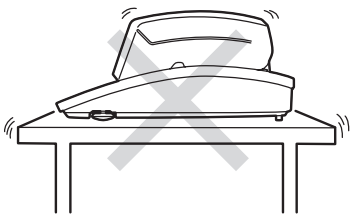


Instructions

Place the moisture analyzer on a rigid, stable, and flat table, or on the floor in the room.

Placing the moisture analyzer on an unstable surface may cause personal injury or a malfunction.

Secure a sufficient space for your measurement work in consideration of the total weight of measuring objects and the moisture analyzer loaded on the installation location.



Prohibitions

Only connect peripherals that have been specified by us to the connector of the moisture analyzer.

Connecting other peripherals may cause abnormal operation.

To prevent problems, be sure to connect peripherals using the procedure specified in this instruction manual.

Instructions

After a power failure, turn the power switch on.

If a power failure occurs, the power is automatically turned off. See "Turning the Power On" (☞ Page 38) to restore operation.

Instructions

If an abnormal situation occurs (for example, a burning odor is smelt), remove the power cable immediately.

If you continue operating the device in an abnormal situation, fire or electric shock may result.

Precautions

The moisture analyzer includes a heater that heats samples to dry them off during measurement. The heater becomes hotter than the preset heating temperature. Incorrect handling may cause fire, explosion, burn injury, or other injury. To ensure your safety during measurements, carefully read this section along with "Safety Notes", (☞ page 6) and follow the guidelines outlining correct operation procedures.

Samples

The samples measured with the MOC63u moisture analyzer are heated during the measurement. Measuring hazardous samples may lead to burn injuries or fire.

⚠ CAUTION


Prohibitions

Do not measure the following hazardous samples.

- Samples in which the characteristics are unknown.
  Measuring hazardous samples may lead to burn injuries or fire.
- Any sample whose surface hardens or solidifies by heating, causing high inner pressure.
  Such a sample may burst.


Prohibitions

Do not use the moisture analyzer only to dry a sample.

- The moisture analyzer is for measuring the moisture level of a sample, and should not be used for any other purposes.


Instructions

Measure samples within the safety range.

- Use the moisture analyzer only for measurements that vaporize moisture by heating.
- Set the drying temperature within the safe temperature range of each sample.

Environment for Measurements

⚠ CAUTION


Prohibitions

Do not place flammable objects near the moisture analyzer.


Instructions

If lightning is expected to strike, turn the power off and disconnect power cable.

☞ "Turning Power Off", page 50

Handling the Moisture Analyzer During and Immediately after Measurement

⚠ CAUTION

Instructions

Install the parts correctly

Install the sample pan and pan supporter correctly.

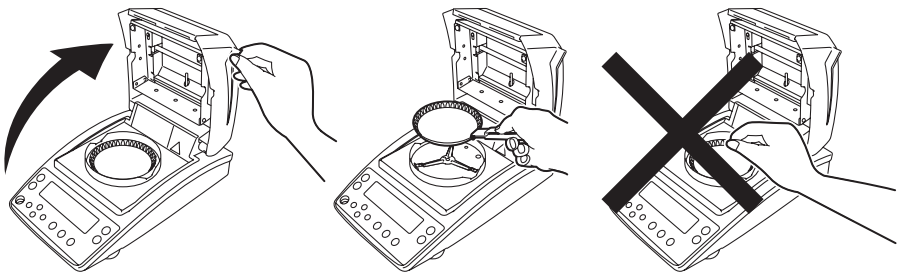
☞ "Installing Parts", page 35

Prohibitions

Do not touch the sample pan and surrounding parts with bare hands during or immediately after measurement.

The sample pan and surrounding parts become extremely hot immediately after measurement. Be sufficiently careful so as not to suffer a burn injury.

- Be sure to use the Sample pan handler when removing the sample pan.
- Never touch any metal parts of the heater or surrounding parts when removing the sample pan. Otherwise, burn injuries may result.



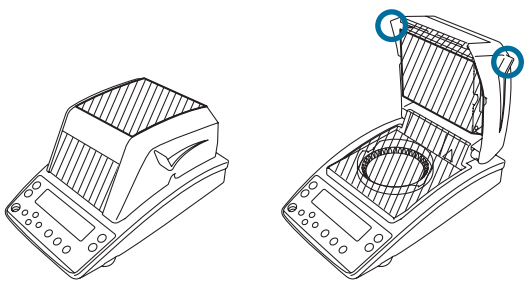
Parts that Become Hot During and Immediately after Measurement

⚠ CAUTION

Prohibitions

Do not touch the shaded areas during and immediately after measurement.

The shaded areas in the following figure become extremely hot. Only touch the round marks when operating.



⚠ CAUTION

Instructions

When the device will not be used for a long period of time, turn the power off and disconnect the power cable.

☞ "Turning Power Off", page 50

Instructions

After a power failure, turn the power switch on.

If a power failure occurs, the power is automatically turned off. Turn the power switch off once, then turn it on again.

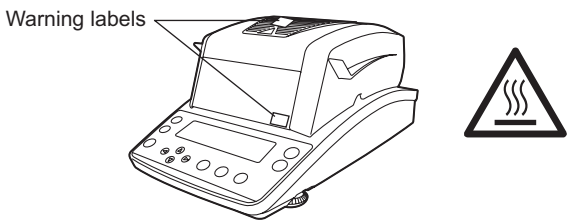
☞ "Turning Power Off", page 50
☞ "Turning the Power On", page 38

Warning labels on device

WARNING

Caution. Hot

Do not touch the black grill or the observation window on the upper part of the heater cover. Doing so may result in a burn injury.



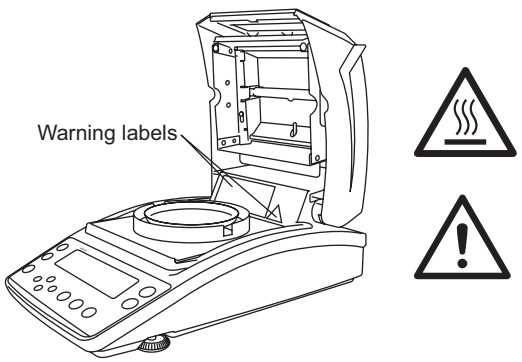
WARNING

Caution. Hot

Start your operation only after heated parts have completely cooled down. Doing so may result in a burn injury.

Preventing measurement of flammable materials

Do not measure flammable materials.



WARNING

Caution. High voltage

Pull out the power cable from a receptacle when changing the heater. Otherwise, you may receive an electric shock.





* When the glass case is removed

How to Search for Desired Items

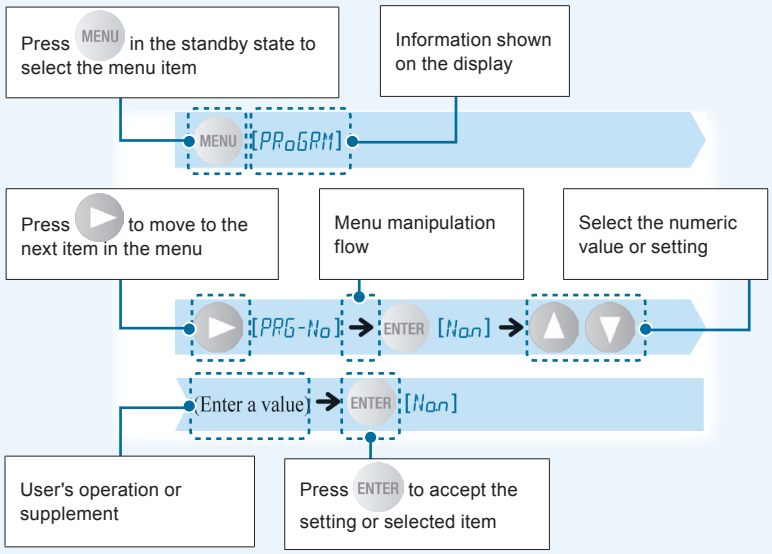
There are various methods you can use to search for the function or operation you want to learn about in this instruction manual.

"Cover Page Index"	You can search for the item on the cover page of the instruction manual.
"What You Can Do", page 4	You can search for the item based on what you want to do.
"Menu Map", page 115	You can quickly search the menu item for the function or procedure you want to use.
"Table of Contents", page 20	You can search for the item in the instruction manual's table of contents.
"Index", page 118	You can search for the item using a previously-known name or keyword.

◆ Notation for menu manipulations

In the instruction manual, some menu manipulations are indicated using simplified symbols.

Example:



◆ Indication on the display panel

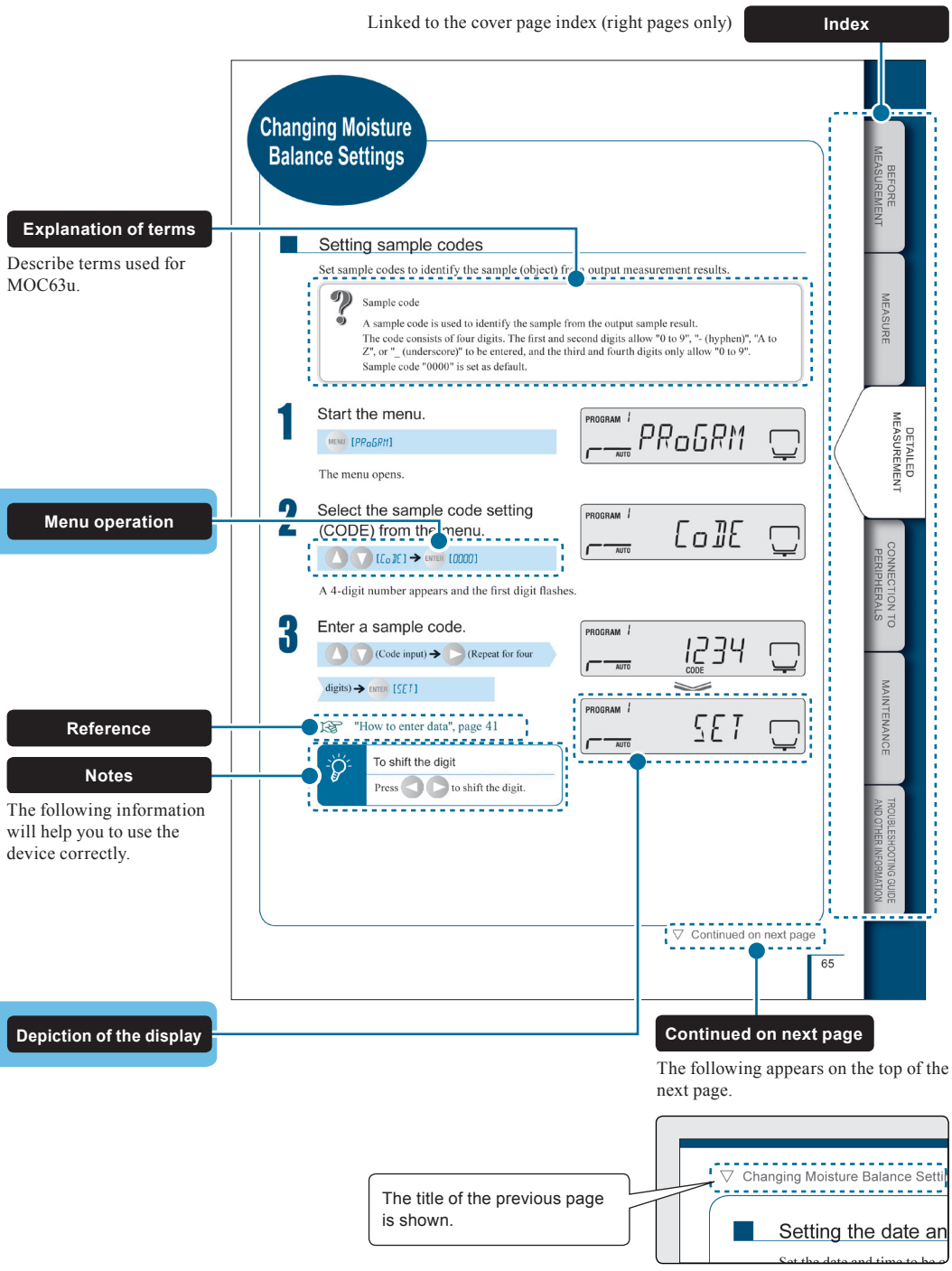
The instruction manual describes the indication on the display panel corresponding to each operating procedure.

The operations of the display panel (flashing, lighting up, and confirmation) are indicated as follows:

- Flashing
- Lighting up
- Confirmation



◆ Sample page (The following is a sample page to show the layout of this document. The content does not provide actual operations.)



After-Sales Service

If this product does not operate normally, follow the guidelines in "Troubleshooting Guide" (☞ P. 110) to analyze and manage the problem.
If the problem still persists, or a symptom occurs presumably caused by another failure, contact our service representative (details on back cover).

Supply of Parts

Repair parts for this product shall be kept for a period of seven years after this product is discontinued.
Please note that, after the above-mentioned period, a requested spare part may not be able to be supplied.
As exceptions, non-genuine repair parts shall be supplied during the period determined by the relevant manufacturer.

MEMO

Action for Environment (WEEE)

To all user of Shimadzu equipment in the European Union:

Equipment marked with this symbol indicates that it was sold on or after 13th August 2005, which means it should not be disposed of with general household waste. Note that our equipment is for industrial/professional use only.

Contact Shimadzu service representative when the equipment has reached the end of its life.

They will advise you regarding the equipment take-back.
With your co-operation we are aiming to reduce contamination from waste electronic and electrical equipment and preserve natural resource through re-use and recycling.
Do not hesitate to ask Shimadzu service representative, if you require further information.



WEEE Mark

MEMO

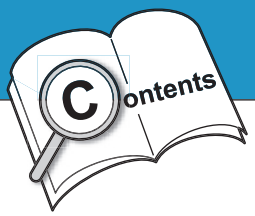


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MEMO

1 Before Measurement

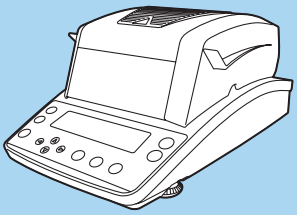
Checking Package Contents

Be sure to check that the package contains all of the following parts and that all parts are undamaged.

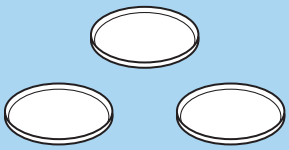
A number shown in [ ] indicates a quantity.

If you find that any of the parts are missing, damaged, or deformed, contact an authorized Shimadzu sales representative.

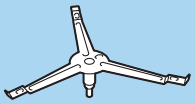
☐ Moisture Analyzer unit [1]



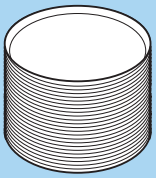
☐ Sample pan [3]



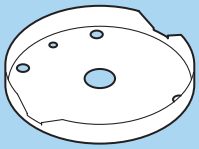
☐ Pan supporter [1]



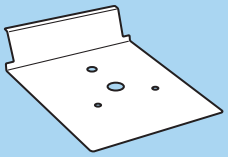
☐ Aluminum pan (disposal) [50]



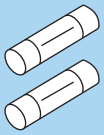
☐ Windbreak [1]



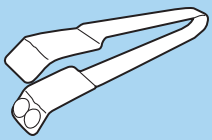
☐ Heater insulation plate [1]



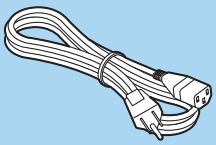
☐ Spare fuse [2]



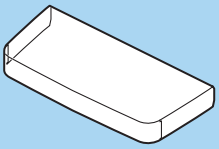
☐ Sample pan handler [1]



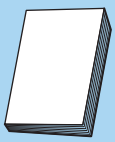
☐ Power cable [1]



☐ Display protect cover [1]



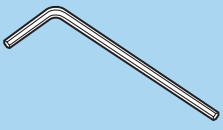
☑ Instruction manual [1]



☐ Menu map sheet [1]



☐ Hexagonal wrench SB2.5 [1]

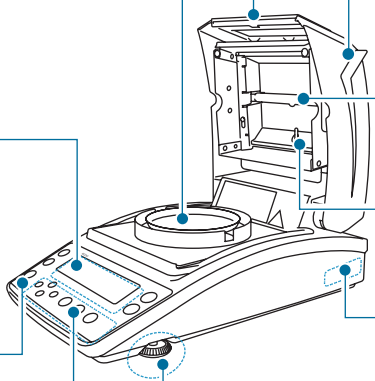


Names and Functions of Parts

The following explains the individual parts and components of the MOC63u moisture analyzer.

Main Unit

◆ Front



Observation window

You can observe the condition of the sample (object) even when the heater is turned on and the heater cover is closed.

Pan

Set the pan supporter and sample pan on this, then place an object.

Display panel

Displays measurement results, information for function settings, functions currently running, errors, and other information.
(☞ page 28)

Level gauge

Used to adjust the level of the moisture analyzer.
(☞ page 36)

Keyboard

Used for menu manipulation, tare cancellation, setting measuring conditions or functions, or span calibration.
(☞ page 27)

Heater cover

A heater is included in the heater cover.
Close the heater cover before measurement.

Heater

Used to dry samples (objects).

Temperature sensor

Detects temperature.

Product label

Shows the model name and the unit number.

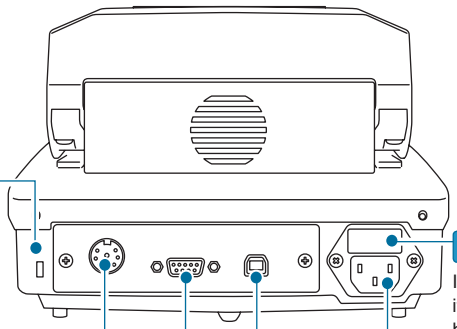
Level screws

Used to adjust the level of the moisture analyzer.
(☞ page 36)

▽ Continued on next page

▽ Names and Functions of Parts

◆ Rear



Kensington security slot

A mounting hole for anti-theft key. This slot complies with the Kensington standard.

DATA I/O connector

Used to connect a printer (EP-80, EP-90, etc.)
(☞ page 91)

RS-232C connector (9-pin socket)

Used to connect the main unit to a PC via serial interface.

Fuse holder

If a fuse breaks, replace it with a fuse in this fuse holder.

Power inlet

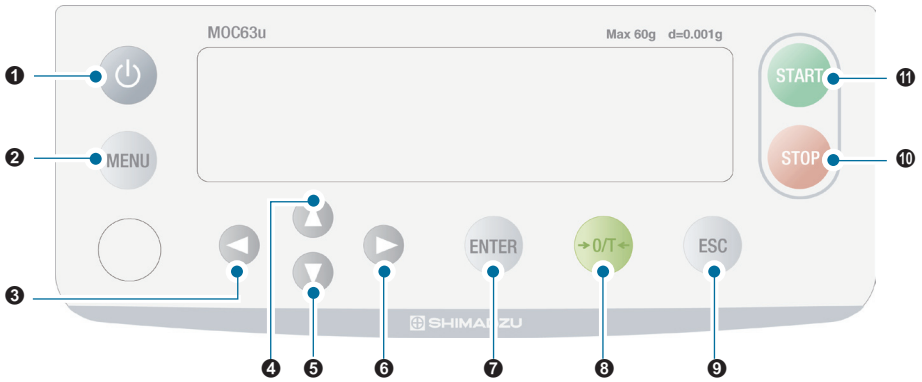
Connect the power cable to supply power to the moisture analyzer.

USB connector

Used to connect the main unit to a PC.

Keyboard

The following explains the keys placed on the top of the moisture analyzer.

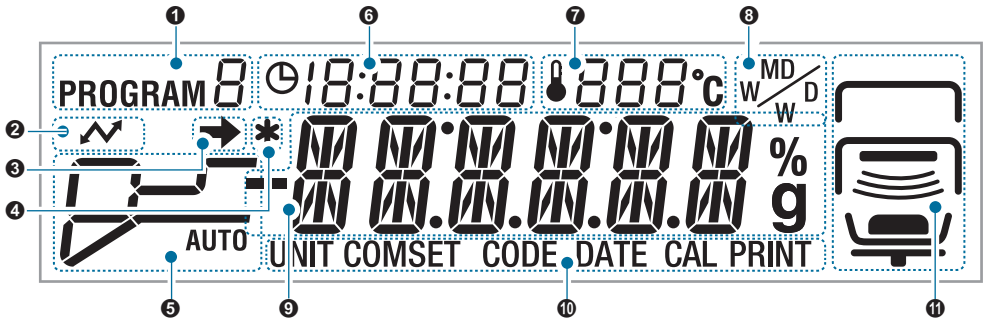


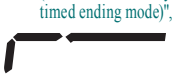
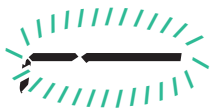
No.	Key	Description
❶		Turns the power on or off.
❷	MENU	Calls the menu during the standby state (measurement display).
❸		Returns to the upper level of the menu tree. Shifts the digit to the left when the date and time, password, sample code, or ID is entered.
❹		Selects the menu item. The setting value increases when the code, date and time, temperature, or password is entered.
❺		Selects the menu item. Decreases the setting value when the code, date and time, temperature, or password is entered.
❻		Moves to the lower level of the menu tree. Shifts the digit to the right when the date and time, password, sample code, or ID is entered.
❼	ENTER	Applies the setting.
❽	0/T	Clears the display to zero (0) when a sample pan is placed and this key is pressed.
❾	ESC	Returns to the menu during setting. Press this key again to return to the standby state (measurement display). Returns to the standby state (measurement display) when the measurement ends. Releases the error when an error occurs.
❿	STOP	Stops the measurement.
⓫	START	Use this function when "Manual mode" is selected for the method to start measurement .

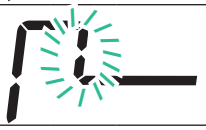
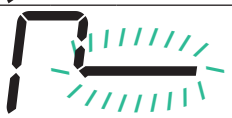
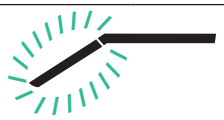
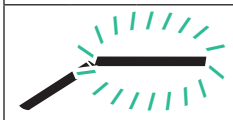
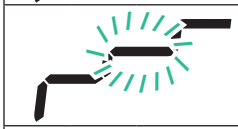
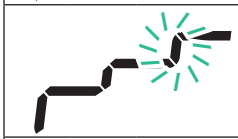
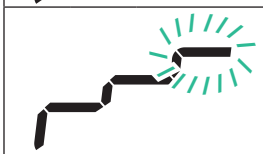
▽ Continued on next page

▽ Names and Functions of Parts

Display Panel



No.	Display	Description	
❶	PROGRAM 0	Indicates the program No. (0 to 9) currently selected. For further information on how to select the program No., see steps 1 to 3 of "Selecting the Measurement Condition Program No." (☞ page 52).	
❷		When shown: Communicates with other equipment (printer, PC, etc.) via RS-232C, DATA I/O, or USB. When hidden: No equipment is communicating using RS-232C, DATA I/O, or USB.	
❸		When shown: The measured value is stable. When hidden or flashing: The measured value is not stable. Re-examine the environment where the moisture analyzer is installed, and adjust the level of the moisture analyzer. * Flashing during menu display indicates that the setting corresponding to the menu item is valid. ☞ "Measuring Moisture Content", page 44	
❹	✱	When shown: The measurement is completed. Press ESC to return to the standby state (measurement display). When hidden: Currently in the standby state or measurement process, or settings are being changed.	
❺	The setup mode and measurement state of measuring conditions	Displays the setup mode and measurement state of measuring conditions. The current measurement state is available from flash of the bar encircled by the dotted line.	
	AUTO: Standard drying automatic ending mode ☞ "Setting Temperature and the Amount of Change in Moisture Content (ΔM) as Measurement Conditions (AUTO: Standard drying automatic ending mode)", page 53 		The measurement is started. The temperature is rising.
			The measuring temperature has reached the preset level. The drying process continues until ΔM (moisture change rate per 30 seconds) set as the ending condition is reached.
	TIME: Standard drying timed ending mode ☞ "Setting Temperature and Time as Measuring Conditions (TIME: Standard drying timed ending mode)", page 55 		The measurement is started. The temperature is rising.
			The measuring temperature has reached the preset level. The drying process continues until the time set as the ending condition is reached.

No.	Display	Description	
❺	RAPID: Rapid drying mode ☞ "Measuring Samples by Raising Temperature Rapidly (RAPID: Rapid drying mode)", page 56 		The measurement is started. The temperature is rising.
			Continues drying at the maximum temperature after the temperature has reached the maximum and it also reaches Δ M (amount of change in moisture content per 30 seconds) set as the rapid drying mode condition.
			The temperature is dropping to the preset level.
			The measuring temperature has reached the preset level. The drying process continues until ΔM (moisture change rate per 30 seconds) or the time set as the ending condition is reached.
	SLOW: Slow drying mode ☞ "Measuring Samples by Raising Temperature Gradually (SLOW: Slow drying mode)", page 58 		The measurement is started. The temperature is rising.
			The measuring temperature has reached the preset level. The drying process continues until ΔM (moisture change rate per 30 seconds) set as the ending condition is reached.
	STEP: Stepped drying mode ☞ "Measuring Samples by Setting Temperature Step by Step (STEP: Stepped drying mode)", page 60 		The measurement is started. The temperature is rising.
			The set first step temperature is reached.
			The temperature is rising to the second step level.
			The set second step temperature or ΔM (moisture change rate per 30 seconds) is reached.
			The temperature is rising to the third step level.
			The set third step temperature is reached. The drying process continues until the time or ΔM (moisture change rate per 30 seconds) set as the ending condition is reached.

▽ Continued on next page

▽ Names and Functions of Parts

No.	Display			Description
❻	0:06:54			Indicates the time elapsed after the start of measurement.
❼	120℃			Indicates the temperature inside the heater cover during measurement.
❽	M/W			Indicates the measurement result display currently selected. For further information on changing the display, see "Setting the Measurement Standard" (☞ page 63).
		%	M/W	Moisture content (Wet Base)
			D/W	Dry content (Wet Base)
			M/D	Moisture content (Dry Base)
			W/D	Dry content (Dry Base)
		g	GRAM	Mass
❾	Main display	Standby state	0.000 g	The measured value by the balance is displayed.
		Measuring	12.34 %	The moisture measurement is displayed.
		Menu	PROGRM	The menu and the setting items are displayed.
		Ready status	READY	The moisture analyzer is in the energy saving mode and ready for use. ☞ "Ready status is", page 50
❿	Displays the following menu item currently selected.			
	UNIT			The selected menu item is for setting the format to display the current measurement. ☞ "Setting the Measurement Standard", page 63
	COMSET			The selected menu item is for setting the method to output data to a printer or PC. ☞ "Setup and Use of the Communication Tool", page 85 ☞ "Enable the Windows Direct Function", page 79
	CODE			The selected menu item is for setting sample codes to be output as a measurement result. ☞ "Setting Sample Codes", page 67
	DATE			The selected menu item is for setting the date and time to be output as a measurement result. ☞ "Setting the Date and Time", page 68
	CAL			The selected menu item is for calibrating the moisture analyzer. ☞ "Calibrating Moisture Analyzer", page 73
	PRINT			The selected menu item is for setting the output of measurement results and the timing of the output. ☞ "Printer Output (Option)", page 91

No.	Display	Description		
⓫		Indicates the moisture analyzer status.		
		Upper 		When shown: The heater cover is open. When flashing: You must close the heater cover currently open. When hidden: The heater cover is closed.
		Middle 		When shown: The heater cover is closed. When hidden: The heater cover is open.
				When flashing: The heater is running and the measurement is in process. When hidden: The heater is not running.
		Lower 		When shown: A sample is placed on the sample pan. When flashing: A sample is not placed on the sample pan. Place a sample on the sample pan. When hidden: A sample is not placed on the sample pan.
				When shown: A sample is placed on the sample pan. When flashing: Cancel the tare of the sample pan. When hidden: A sample pan is not placed.
				When turned on: The pan supporter is installed. Blinking: The pan supporter is not installed.

Installation

The following explains the process flow from installing the moisture analyzer to starting measurements.

Determining Installation Location

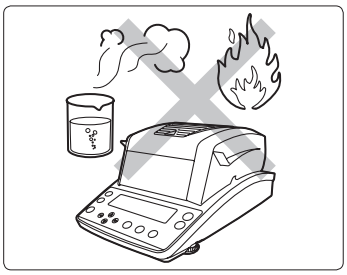
Measurement performance of the moisture analyzer depends largely on environments where the moisture analyzer is installed.
To ensure safe and accurate measurements, follow the following precautions.

⚠ CAUTION

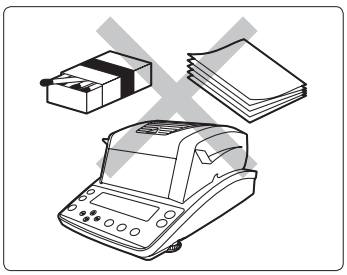
Prohibitions

Do not use the moisture analyzer in the following locations:

- Where corrosive gas or inflammable gas is present



- Where a flammable material is present



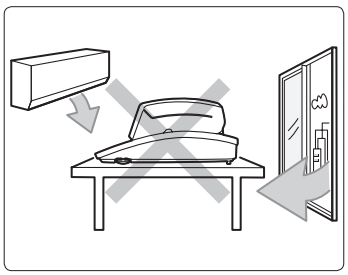
⚠ CAUTION

Prohibitions

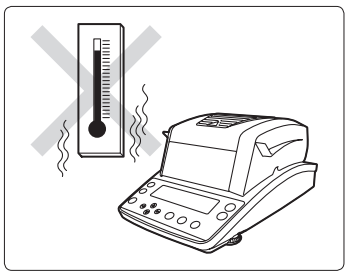
Do not use the moisture analyzer in the following locations:

The measurement result may be incorrect.

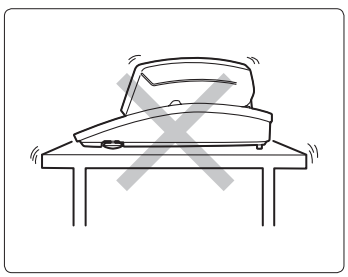
- Where there is an air flow (near an air-conditioner, air vent, door, window, etc.)



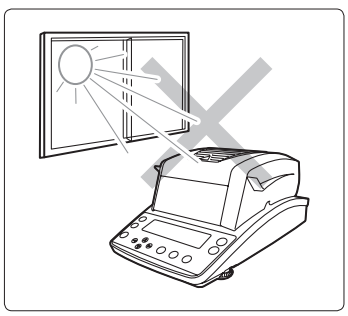
- Where temperature changes extremely



- Where vibration occurs



- Exposed to direct sunlight



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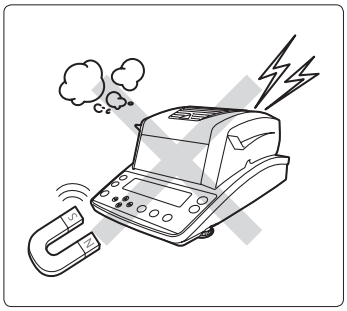
▽ Installation

⚠ CAUTION

Prohibitions

Do not use the moisture analyzer in the following locations:

- Where dust, electromagnetic waves, or magnetic fields are present



Instructions

Place the moisture analyzer on a rigid, stable, and flat table, or on the floor in the room.

Placing the moisture analyzer on an unstable surface may cause personal injury or a malfunction.

Secure a sufficient space for your measurement work in consideration of the total weight of measuring objects and the moisture analyzer loaded on the installation location.

Instructions

Use the moisture analyzer with the correct power source and in the specified voltage environment.

Using the moisture analyzer with an inappropriate power source or voltage level may result in fire or malfunction.

Also note that the optimal performance may not be achieved when power source or voltage is unstable, or power capacity is insufficient.

Instructions

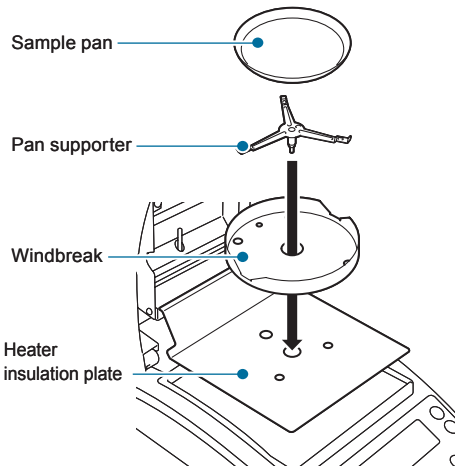
Do not palace anything which may interfere the unplugging operation near the mains connector of the power supply cable.

Installing Parts

Take the following steps to install the moisture analyzer parts.

1 Install the heater insulation plate.

Install the heater insulation plate onto the case.
Align the hole in the heater insulate plate with that in the pan supporter, and place the heater insulation plate on the case.



2 Install the Windbreak.

Align ◆ on the case with ◆ on the windbreak, and place them on the heater insulation plate.

3 Install the pan supporter.

Place the pan supporter on the axis of the moisture analyzer main unit.
Align ◆ on the pan supporter with ◆ on the windbreak, and insert them onto the bottom.

4 Place a sample pan.

Place a sample pan on the pan supporter so that brim of the supporter can secure the sample pan.

▽ Continued on next page

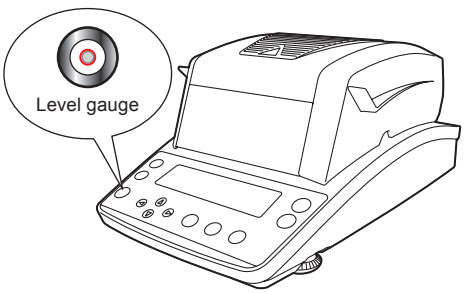
▽ Installation

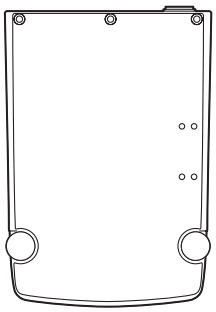
Adjusting the Level of the Moisture Analyzer

This moisture analyzer unit maintains the level with three points on the bottom: One fixing point at the rear middle position, and two level screws on the front right and left positions.
You can check the level gauge to determine the level.

How to operate the level screws

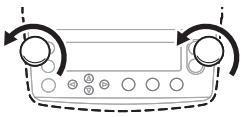
The height of the level screws can be changed by rotating it.
Rotate it clockwise (as seen from the top) to increase the height of the adjuster, and so is moisture analyzer unit.
Rotate it counterclockwise (as seen from the top) to reduce the height of the adjuster, and so is moisture analyzer unit.





After installing or moving the moisture analyzer unit, take the following steps to adjust the level of the unit.

1 Rotate the right and left level screws counterclockwise (as seen from the top).



Rotate them carefully until they stop.
The adjusters shrink and the front of the unit drops.

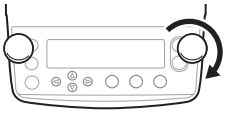
2 Rotate the right and left adjusters until the air bubble in the level gauge appears at the lateral center.

At this step, you can neglect the longitudinal position of the air bubble.

When the air bubble is on the left



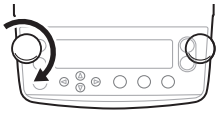
Rotate the front right adjuster clockwise.



When the air bubble is on the right



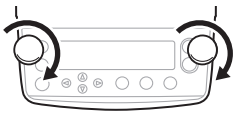
Rotate the front left adjuster clockwise.



3 Rotate the right and left adjusters at the same time until the air bubble in the level gauge appears at the longitudinal center.

Adjust them until the air bubble appears at the center of the red circle.

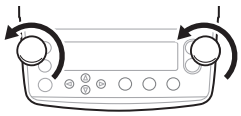
When you rotate two level screws clockwise at the same time...



The air bubble moves forward.



When you rotate two level screws counterclockwise at the same time...



The air bubble moves backward.



Preparing for Measurement

Turn on the power of the moisture analyzer before starting measurement.

"Turning the Power On", page 38

When you use the moisture analyzer for the first time, we recommend the span calibration after installation.

"The Span Calibration after Installing the Moisture Analyzer", page 40

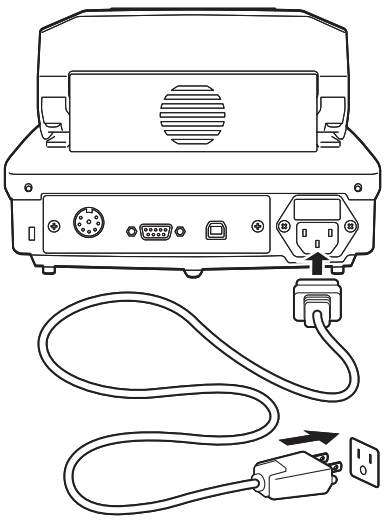
Turning the Power On

The following explains how to turn the power on.

1 Connect the power cable.

❶ Insert the female end of the power cable into the power inlet located at the rear of the main unit.

❷ Plug in the male end of the power cable to the outlet.

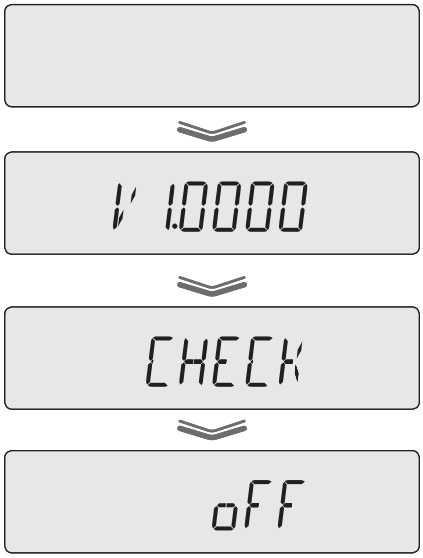


CAUTION

Instructions	To prevent electric shock and to maintain stability in operation of the product, be sure to ground the product.
Instructions	Use the specified power cord (10A rating).
Instructions	Do not palace anything which may interfere the unplugging operation near the mains connector of the power supply cable.

When the power switch is turned on, the version number (*1) is displayed and the internal system is checked automatically.
Then, "oFF" appears on the display panel.

(*1) The version number is subject to change without notice.

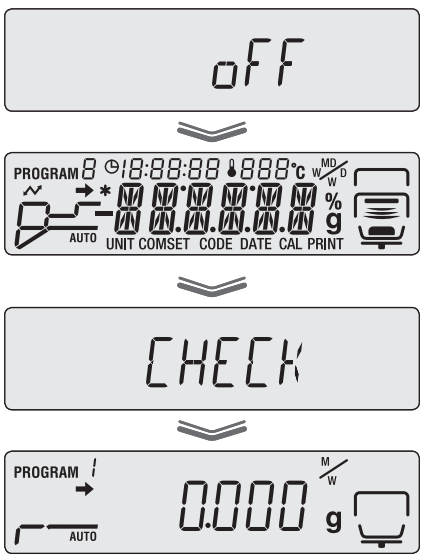


2 Press

[oFF] [(The entire display lights up.)]

→ [CHECK] → [0.000g]

The device enters the standby state.
If you start measurement by using the program No. displayed on the upper left of the display, proceed to step 4 of "Measuring Moisture Content" (page 44).



▽ Continued on next page

The Span Calibration after Installing the Moisture Analyzer

After installing the moisture analyzer, we recommend you warm it up and perform span calibration to stabilize the moisture analyzer. The span calibration is possible between 10 and 60 grams, however, a 50-gram calibration weight is recommended.

1 Turning the power on.

☞ "Turning the Power On", page 38

2 Wait for at least one hour (to warm up the moisture analyzer).

To calibrate the sensitivity for precision measurement, the moisture analyzer must be in a stable state wherever possible. To stabilize the moisture analyzer, we recommend you leave it to the standby state for at least one hour. This is called "Warming-up".

3 Start the menu.

MENU [PROGRM]

The menu appears.

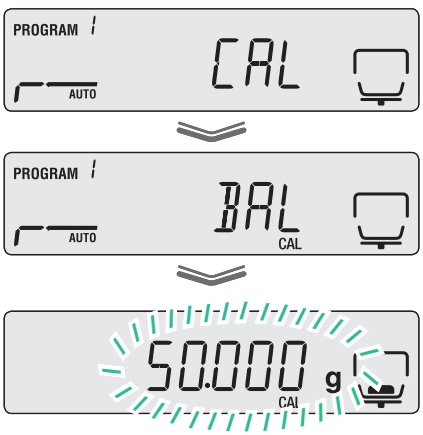


4 Start the span calibration.

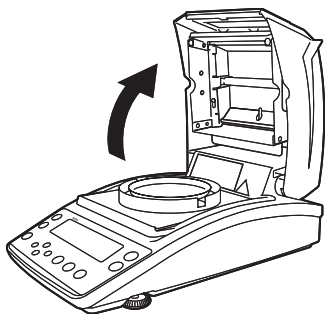
▲ ▼ [CAL] → ENTER [BAL] → [WAIT]

ENTER [50.000g]

If [TEMP] is displayed instead of [BAL], press ▲ or ▼ to display [BAL].



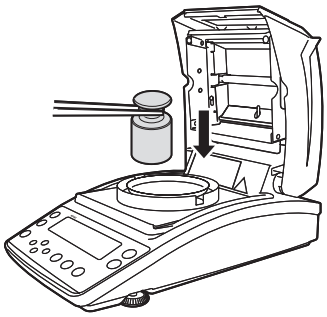
5 Open the heater cover.



6 Place a 50-gram calibration weight on the sample pan.



When the mass indication flashes, place the weight.



When you use a weight other than 50 grams...

If you use a weight other than the 50-gram one, reset the corresponding mass by pressing ▲ ▼. Then, press ENTER and place the weight.

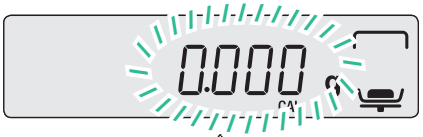
When the weight is placed, the measurement of 50 grams starts.

To Calibrate with the heater cover closed…

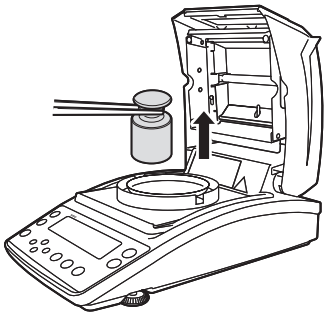
Ensure that the glass protect plate does not come in contact with the calibration weight when the heater cover is closed. If it does, open the heater cover and perform calibration within an environment without any disturbance (vibration, wind).

7 Lower the calibration weight when [0.000] starts to flash.

The measurement of 0 grams starts.



When the mass indication flashes, remove the weight.



8 Wait until [END] is displayed.

The span calibration ends when [END] is displayed.
The display returns to BAL after a short period of time. Press ESC to enter the standby state.
You can also calibrate the temperature. For further information, see "Calibrating the Temperature (Option)" (☞ page 73).

Menu

Use the menu to configure measuring conditions for the MOC63u moisture analyzer, or to set the display and output of its measured values.

How to Use the Menu

The following describes how to use the menu.

- Press MENU to call up the menu.
- Press ▲ or ▼ to select the item, and press ENTER to accept the selection.
  If a lower level of the menu tree is shown, move to the lower level.
- Press ▶ to move to the lower level.
- Press ◀ to return to the upper level.
- To return to the standby state from the menu, press ESC .

How to Use the Menu Map

The menu map allows the user to conveniently and quickly access menu items.

"Menu Map", page 115

How to Enter Data

Some menu items such as temperature, time, ΔM (Moisture change rate for 30 seconds), and password require input of values.

◆ Key operation

Key	Operation			
Input data	Temperature Time ΔM	Password ID	Sample code	Upon date entry Upon time entry
	The value (0 to 9) increases. If this key is held down, the value changes from 9 to 0 and the tenth digit is incremented.	In the password field: The display value changes from 0 to 9 sequentially. In the ID input field: Values 0 to 9, a negative sign (-), characters A to Z, and a space are displayed sequentially.	First and second digits: Values 0 to 9, a negative sign (-), characters A to Z, and a space are displayed sequentially. Third and fourth digits: The value (3 to 9) increases.	The value increases.
	The value decreases. If this key is held down, the value changes from 1 to 0 and the tenth digit is decremented.	In the password field: The display value changes from 9 to 0 sequentially. In the ID input field: A space, characters Z to A, a negative sign (-), and values 9 to 0 are displayed sequentially.	First and second digits: A space, characters Z to A, a negative sign (-), and values 9 to 0 are displayed sequentially. Third and fourth digits: The value decreases.	The value decreases.
	Returns to the previous setting.	Shifts the active digit (that is flashing) to the left by one. Four digits for a password or ID.	Shifts the active digit (that is flashing) to the left by one. Four digits for a sample code.	Shifts the active digit (that is flashing) to the left by one. Specify each of the year, month, and date in two digits.
	Goes to the next setting.	Shifts the active digit (that is flashing) to the right by one.	Shifts the active digit (that is flashing) to the right by one.	Shifts the active digit (that is flashing) to the right by one.
	Accepts the entered value.			

2 Measure

Measuring Moisture Content

You can call preset measuring conditions for measurement with the moisture analyzer. When you use the moisture analyzer for the first time, set measuring conditions. For further information on how to turn the power on, see "Turning the Power On" (☞ Page 38). For details on setting the measuring conditions, see "Setting Measuring Conditions" (☞ Page 52).

The following explains how to start measurement after the standby state.

1 Confirm the standby state.

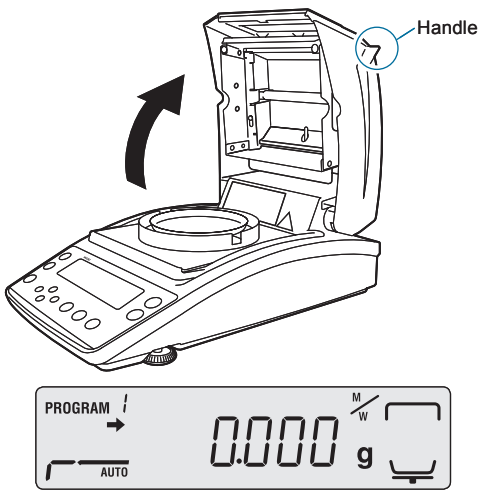
Confirm that the device is in the standby state (measurement display) as shown in the figure at right.

Press ESC to set it to the standby state when the menu items and measurement results are displayed on the display panel.



2 Open the heater cover.

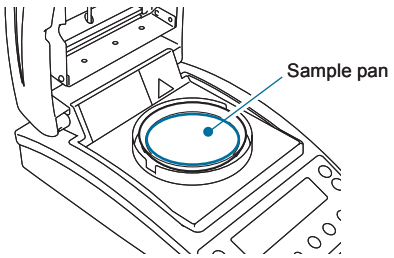
Hold the handle of the heater cover (shown in figure at right), and carefully open the lid to the end.



3 Place a sample pan.

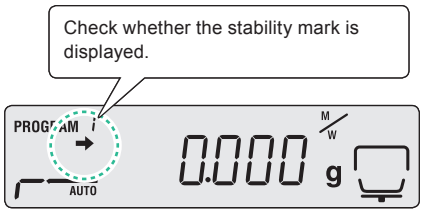
Place a sample pan on the pan supporter.

Use a sample pan that is kept at room temperature.



4 ➡ Be sure that (the stability mark) is displayed, and adjust the zero point.

→0/T← [0.000g]



Before adjusting the zero point, be sure that the pan supporter and an empty sample pan are placed.

"Installing Parts", page 35

Do not expose the moisture analyzer to wind or vibration before adjustment is completed.

What is the zero point adjustment?

An operation that cancels the mass of tare such as sample pan to measure the mass of sample correctly.

The heater cover during the zero point adjustment

Always be sure that the heater cover is closed when adjusting the zero point.

After adjusting the zero point.

Start measurement within thirty minutes after the zero-point adjustment. If you do not start measurement within thirty minutes, a message (TIM.oUT) occurs in order not to do unexpected operation.

If the message occurs, press ESC to return to the standby state (measurement display).

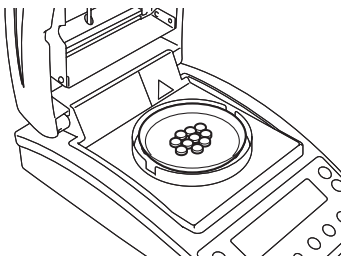
Start measurement promptly after adjusting the zero point.

5 Place a sample (object) on the sample pan.

Be sure to place the sample as flat as possible on the pan so that heat is applied evenly to the sample during measurement.

Use a sample pan kept at room temperature.

"To Obtain the Best Results", page 47





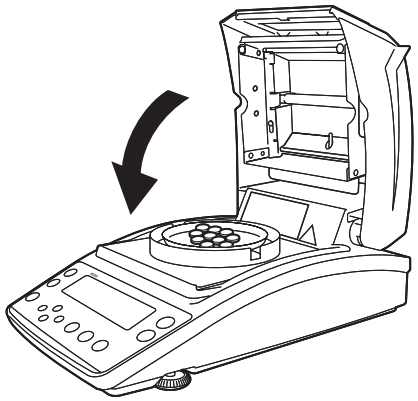
A sample that is less than 0.02 grams cannot be measured.

A sample that is less than 0.02 grams may be detected as a balance error. Place a sample with at least 0.02 grams on the sample pan.

▽ Continued on next page

6 Close the heater cover.

The measurement starts automatically.







If the measurement does not start automatically…

Manual start is set for measurement.

Press START to start the measurement.

Switching between automatic and manual start modes

As the default setting, measurement start automatically after a sample is placed and the heater cover is closed. You can switch the mode to manual start. "Setting the Method to Start Measurement", page 66

To check the ΔM…

When ▽ is pressed in any measurement mode, the display switches and the ΔM value is shown. Press this key again to return to the previous display.

What is ΔM?

ΔM is the rate of moisture change after 30 seconds.

"Setting Temperature and the Amount of Change in Moisture Content (ΔM) as Measurement Conditions (AUTO: Standard drying automatic ending mode)", page 53

Do not touch the inside of the heater cover immediately

The heat-dispersing component of the heater cover and the sample pan release heat during and immediately after the measurement. Do not touch the moisture analyzer with your bare hands.

7 Check the measurement result.



Short beep sounds indicate that the measurement is completed. The display panel shows the measurement result and the measurement completed indicator (✱). You can output the measurement result to a printer or PC if necessary. The factory default setting for the output results is "FINAL".

"Setting a Measurement Data Printout Timing", page 92

The heater fan stops automatically.

8 Reset the measurement result.

ESC



The water content indicator and measurement completed indicator relating to the measurement result disappear, and the mass after drying process appears.

To measure the same sample after the measurement successively...

If you switch the mode to manual start, you can measure successively by pressing START after resetting the measurement result.

Proceed to "After Measurement", page 49.

To Obtain the Best Results

The following explains how to measure moisture content correctly.

◆ Precaution for carrying out measurements in succession

- Placing a sample on the warmed sample pan may cause moisture from the sample to evaporate before starting measurement, causing an error in measurement result. Be sure to use a sample pan kept at room temperature when measuring another samples.
- When measuring samples in succession, keep a constant interval between the measurements wherever possible. If the temperature inside the moisture analyzer is not stable, errors may affect the measurement results.

◆ Quantity and placement of powdered, particulate and viscous sample materials

- A sample must be placed on the sample pan flatly. Samples cannot be heated properly if they are not placed flatly. Placing samples in mounds or in layers of varying thickness may cause the highest points to be burned, leading to inaccurate measurement results.
- Placing a larger amount of sample flatly can lead to more accurate measurement. However, if the amount is too large, the surface of the sample may burn before inside is dried out.
- See the following figures to place the appropriate amount of sample flatly.



◆ Measuring liquid samples

- Depending on the sample, you can reduce the measurement time and improve the measurement accuracy by using fiberglass (option).

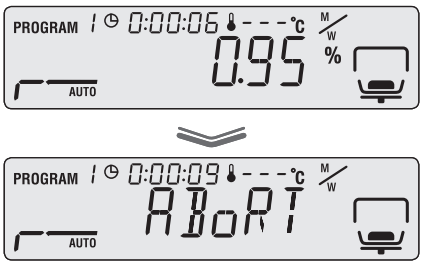
Aborting Measurement

You can abort the measurement in process.

1 Press STOP during measurement.

STOP [ABoRT]

A long beep sound is heard, and "ABoRT" appears on the display.



2 Return to the standby state.

ESC → [(Standby state.)]

The moisture analyzer enters the standby state without saving the measurement result.
When the [STOP] key is pressed again, the measurement completed indicator is displayed, the measurement results are stored in the moisture analyzer, and the device enters the standby state.



Do not touch the moisture analyzer immediately

The heat-dispersing component of the heater cover and the sample pan release heat during and immediately after the measurement. Do not touch the moisture analyzer with your bare hands.

The heater fan is still running, and stops after a short period of time.

Proceed to "After Measurement", page 49.

After Measurement

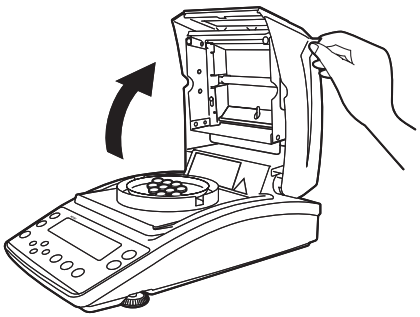
After the measurement of a sample is completed, dispose of the sample and cool off the heater to prepare for the next measurement.

1 Open the heater cover.

CAUTION

Prohibitions

The heater cover is hot during and immediately after measurement. Hold the handle when opening or closing the heater cover.



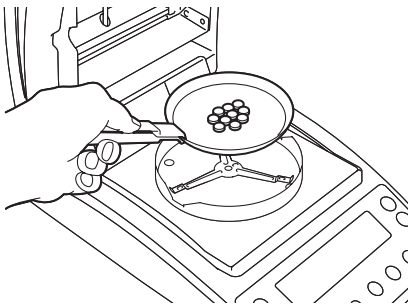
2 Dispose of a sample used for measurement.

Hold an edge of the sample pan with the handler as shown, and remove the sample pan and dispose of the sample.

The sample pan and the sample are hot. Wait until they are cooled off.

After the disposal, return the sample pan onto the pan supporter.

If you used an aluminum pan (disposal), dispose of it together with the used sample.



For further information on measuring another sample in succession, see "Precaution for carrying out measurements in succession" (☞ page 47).

CAUTION

Prohibitions

During and immediately after measurement, the inside of the heater cover and the sample pan is very hot. Use the Sample pan handler to take out the sample pan.

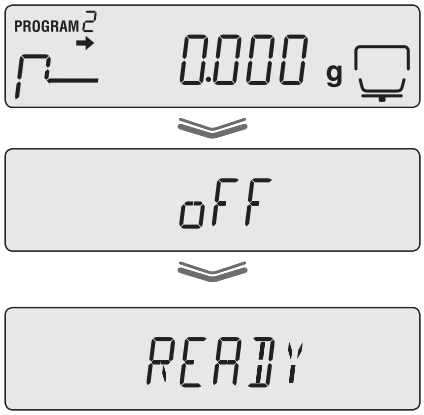
Turning Power Off

The following explains how to turn off the power of the moisture analyzer.

1 Press and hold ⏻ until [oFF] appears on the display.

⏻ (at least 0.2 second.)

If you hold down ⏻ for about 0.2 second, the power switch is turned off. "READY" appears on the panel and the analyzer is ready for use.
To cut the power completely, remove the power cable.



Ready status is…

The moisture analyzer is in the energy saving mode and ready for use.
When the moisture analyzer is in the ready sate, electricity is supplied and the analyzer is kept heated even though it is in the energy saving mode.

MEMO

3 Detailed Measurement

Setting Measuring Conditions

There are four types of drying modes (standard drying, rapid drying, slow drying, and stepped drying) for measurement conditions. There are two types of ending modes (automatic ending and timed ending). Configure the temperature, time, or ΔM (amount of change in moisture content per 30 seconds) for all modes. Saving the measuring conditions enables you to call relevant conditions when needed and measure moisture content based on these conditions. A maximum of 10 measuring conditions can be saved.

The procedures to set measuring conditions are as follows:

- Setting Temperature and the Amount of Change in Moisture Content (ΔM) as Measurement Conditions (AUTO: Standard drying automatic ending mode) page 53
- Setting Temperature and Time as Measuring Conditions (TIME: Standard drying timed ending mode) page 55
- Measuring Samples by Raising Temperature Rapidly (RAPID: Rapid drying mode) page 56
- Measuring Samples by Raising Temperature Gradually (SLOW: Slow drying mode) page 58
- Measuring Samples by Setting Temperature Step by Step (STEP: Stepped drying mode) page 60

To protect the heater

You cannot use the heater for more than one hour with the temperature set above 180°C.

Selecting the Measurement Condition Program No.

Select the program No. to store measurement conditions.

1 Start the menu.

MENU [PRoGRM]



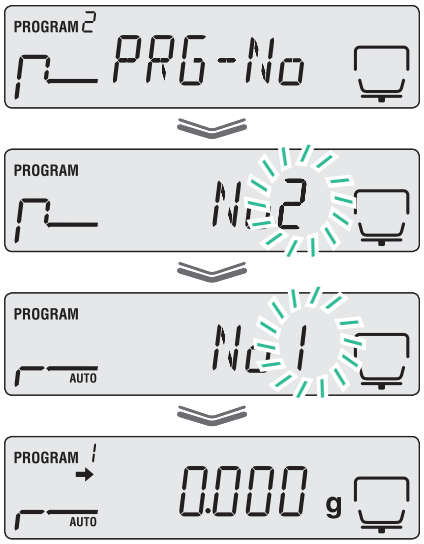
The menu opens.

2 Select the program No. to save measuring conditions.

[PRG-No] → ENTER [Non] (n indicates the program No. currently selected.)

[No0] - [No9] → ENTER [S 1:XXX] (XXX indicates setting of the program No.)

The program No. is changed.
Press ESC to return to the standby state.



■ Setting Temperature and the Amount of Change in Moisture Content (ΔM) as Measurement Conditions (AUTO: Standard drying automatic ending mode)

Standard drying automatic ending mode dries a sample at the set temperature and, when the amount of change in moisture content drops below the set value, terminates the measurement automatically. Set the drying temperature and the ending condition of moisture change rate per 30 seconds.
When GRAM is selected for measurement standard (☞ Page 63), specify ΔM for Moisture Content (Wet Base)

1 Start the menu.

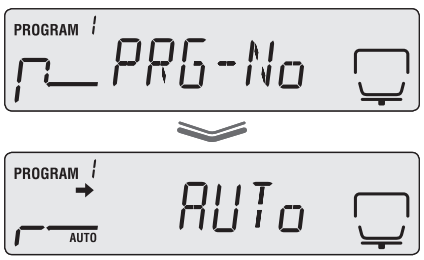
MENU [PROGRM]

The menu opens.



2 Select [AUTO] mode for measuring conditions.

[PRG-No] [AUTO] → ENTER



▽ Continued on next page

▽ Setting Measuring Conditions

3 Specify the temperature.

(Temperature input.) → ENTER

Specify the temperature within the range from 50 °C to 200 °C in 1-degree increments.



4 Specify ΔM.

(ΔM input.) → ENTER

Specify the moisture change rate per 30 seconds within the range from 0.01 % to 0.1 % in 0.01-percent increments.

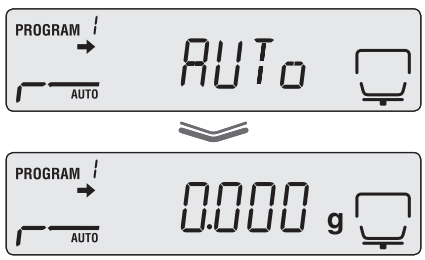
Press ◀ to return to step 3.

Press ENTER to save the measurement conditions.



5 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.



When measuring a sample that has low moisture content...

If you use the standard automatic drying operation mode to measure a sample that has a low moisture content (0.1% or less), it may reach the ending condition at once and your measurement may fail. To measure a sample that has a low moisture content, we recommend that you use the standard drying time mode as explained on the next page.

Setting Temperature and Time as Measuring Conditions (TIME: Standard drying timed ending mode)

Standard dry time ending mode dries a sample at the set temperature and, when the time set as the ending condition is reached, terminates the measurement automatically. Set the temperature and drying time.

This mode is suitable for measurements to be completed within a limited time.

1 Start the menu.

MENU [PROGRM]

The menu opens.



2 Select [TIME] mode for measuring conditions.

[PRG-No] → [TIME] → ENTER





3 Specify the temperature.

(Temperature input.) → ENTER

Specify the temperature within the range from 50 °C to 200 °C in 1-degree increments.



4 Specify the time.

(Time entry.) → ENTER

You can set the drying time until 4 hours in one minute increments, or from 4 hours to 12 hours in one hour increments.

Press ◀ to return to step 3.

Press ENTER to save the measurement conditions.



5 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.





▽ Continued on next page

▽ Setting Measuring Conditions

Measuring Samples by Raising Temperature Rapidly (RAPID: Rapid drying mode)

Rapid drying mode raises the temperature rapidly until the amount of change in moisture content per 30 seconds drops below the set value, then dries a sample at the set temperature. As the ending condition, you can select either the amount of change in moisture content per 30 seconds or the time. When the amount of change in moisture content per 30 seconds drops below the set value, or the time reaches the set value, the measurement terminates automatically. Set ΔM and temperature in rapid drying, and ΔM or time as the ending condition.

This mode is suitable for measuring liquid or other samples that take time to be dried off.

1 Start the menu.

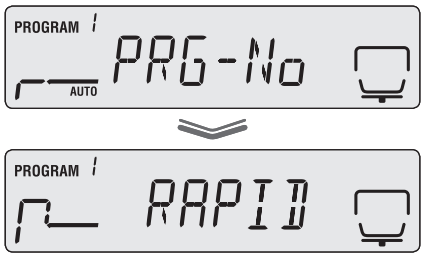
MENU [PROGRM]

The menu opens.



2 Select [RAPID] mode for measuring conditions.

[PRG-No] → [RAPID] → ENTER



3 Specify ΔM for rapid drying.

(ΔM input.) → ENTER

Specify the moisture change rate per 30 seconds within the range from 0.1 % to 9.9 % in 0.01-percent increments.



4 Specify the temperature.

(Temperature input.) → ENTER

Specify the temperature within the range from 50 °C to 200 °C in 1-degree increments.



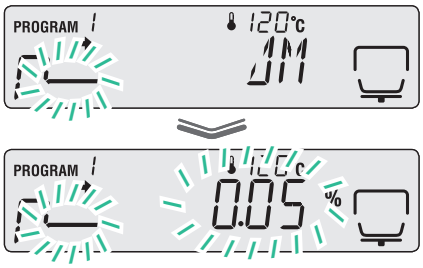
5 Specify the ending condition.

[▲] [▼] [ΔM] [TIME] → ENTER → [▲] [▼]

(ΔM or time input.) → ENTER

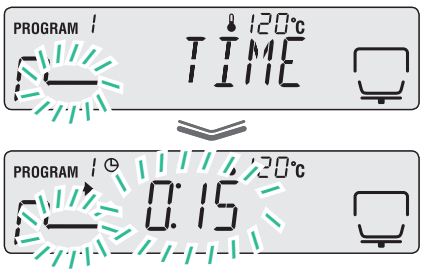
As the ending condition, you can select either the amount of change in moisture content per 30 seconds or the time.

If ΔM is selected, specify the value within the range from 0.01 % to 0.1 % in 0.01-percent increments.



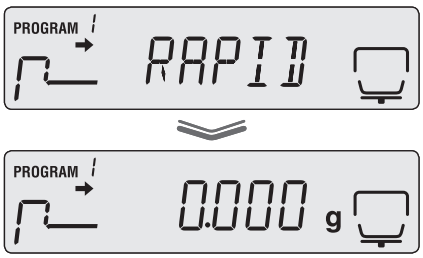
If TIME is selected, you can set the time until 4 hours in one minute increments, or from 4 hours to 12 hours in one hour increments.

Press ENTER to save the measurement conditions.



6 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.



▽ Continued on next page

Measuring Samples by Raising Temperature Gradually (SLOW: Slow drying mode)

Slow drying mode raises the temperature more gradually than measurements in normal conditions, taking about five minutes from the time the measurement begins until the temperature reaches the preset level. As the ending condition, you can select either the amount of change in moisture content per 30 seconds or the time. When the amount of change in moisture content per 30 seconds drops below the set value, or the time reaches the set value, the measurement terminates automatically. Set the temperature for rapid drying, and ΔM or time as the ending condition.

Samples that tend to change in composition in rapid temperature shift may burn dry, making it difficult to measure their moisture contents properly. Slow drying mode can set the heater temperature to rise gradually. This mode is suitable for measuring samples such as protein and high molecular compound that change largely when heated in a high temperature or rapid temperature rise.

1 Start the menu.

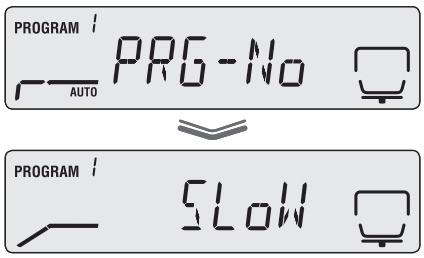
MENU [PRoGRM]



The menu opens.

2 Select [SLoW] mode for measuring conditions.

[PRG-No] → [SLoW] → ENTER



3 Specify the temperature.

(Temperature input.) → ENTER



Specify the temperature within the range from 50 °C to 200 °C in 1-degree increments.

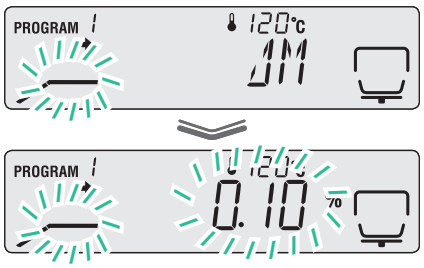
4 Specify the ending condition.

[ΔM] [TIME] → ENTER →

(ΔM or time input.) → ENTER

As the ending condition, you can select either the amount of change in moisture content per 30 seconds or the time.

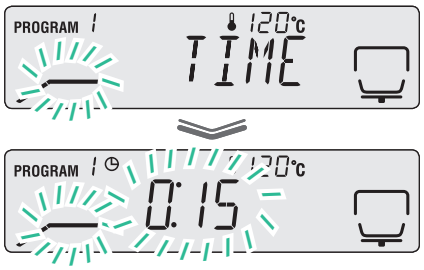
If ΔM is selected, specify the value within the range from 0.01 % to 0.1 % in 0.01-percent increments.



If TIME is selected, you can set the time until 4 hours in one minute increments, or from 4 hours to 12 hours in one hour increments.

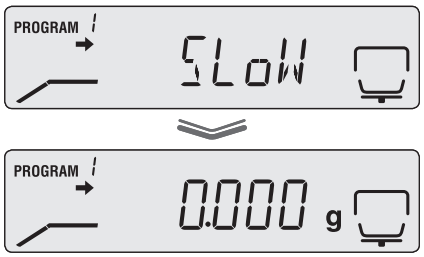
The time to be set here is the time period after the first slow heat drying.

Press ENTER to save the measurement conditions.



5 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.



Measuring Samples by Setting Temperature Step by Step (STEP: Stepped drying mode)

In the Stepped Drying mode, you can set the drying temperature and time in one to three steps for measurement purposes. As the ending condition, you can select either the amount of change in moisture content per 30 seconds or the time. After measuring a sample by changing drying temperature in two or three steps, when the amount of change in moisture content per 30 seconds drops below the set value, or the time reaches the set value, the measurement terminates automatically. Set the temperature and time of the first step, the temperature and time of the second step (ΔM if measurement ends at the second step), the temperature of the third step, and ΔM or time as the ending condition.

If the crystal of hydrate is dried off, heat changes its composition. As a result, moisture content may be measured differently depending on the drying temperature. Stepped drying mode, setting the drying temperature in maximum three steps, is suitable for measuring moisture content at different temperatures.

1 Start the menu.

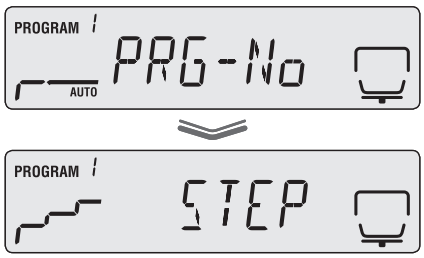
ESC

The menu opens.



2 Select [STEP] mode for measuring conditions.

[PRG-No] → [STEP] → ENTER



3 Specify the temperature of the first step.

(Temperature input.) → ENTER

Specify the temperature within the range from 50 °C to 200 °C in 1-degree increments.



4 Specify the time of the first step.

(Temperature input.) → ENTER

Set the value within the range from one minute to 240 minutes in 1-minute increments.



5 Specify the temperature of the second

(Temperature input.) → ENTER



Specify the temperature within the range from 50 °C to 200 °C in 1-degree increments.

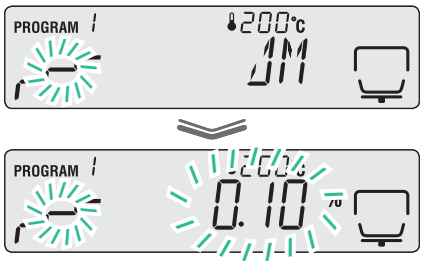
6 Specify ΔM or the time of the second step.

[ΔM] [TIME] → ENTER →

(ΔM or time input.) → ENTER

If the measurement ends at the second step:

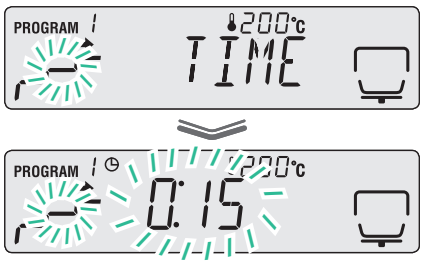
Select ΔM, specify the value within the range from 0.01 % to 0.1 % in 0.01-percent increments, and proceed to step 8.



If the measurement proceeds to the third step:

Select TIME, and specify the value within the range from 0 minute to 240 minutes in 1-minute increments.

If set to zero (0), no measurement starts in subsequent steps.



▽ Continued on next page

▽ Setting Measuring Conditions

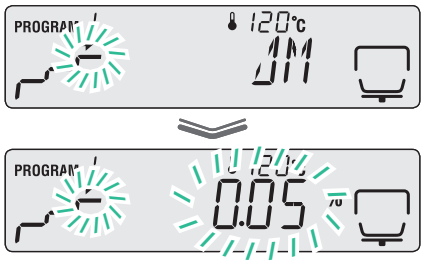
7 Specify the ending condition.

[▲] [▼] [ΔM] [TIME] → ENTER → [▲] [▼]

(ΔM or time input.) → ENTER

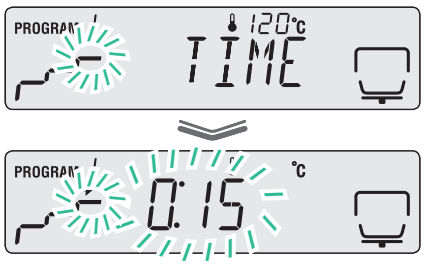
As the ending condition, you can select either the amount of change in moisture content per 30 seconds or the time.

If ΔM is selected, specify the value within the range from 0.01 % to 0.1 % in 0.01-percent increments.



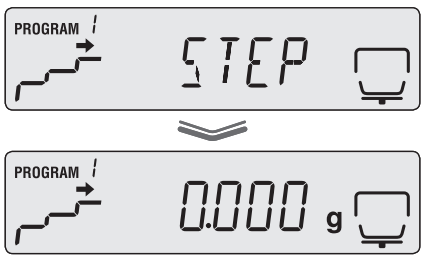
If TIME is selected, you can set a time between 0 and 240 minutes, in minutes.

Press ENTER to save the measurement conditions.



8 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.



Changing Moisture Analyzer Settings

You can change the MOC63u moisture analyzer settings by setting a sample code or by setting a moisture analyzer ID.

Setting the Measurement Standard

You can select the values to be referenced for measurements.
The following shows the denotation of symbols used for formulas calculating the measurement standard.
W: Mass of undried material when measurement starts
D: Mass of dried material when measurement ends
M: The weight obtained by deducting the weight of dried material from the weight of undried material before measurement. (W-D)

◆ Moisture content (Wet Base): M/W

Indicates percentage of evaporated moisture mass vs. the mass before drying process.

$$\frac{W-D}{W} \times 100(\%)$$

◆ Dry content (Wet Base): D/W

Indicates percentage of the residual mass after drying process vs. the mass before drying.

$$\frac{D}{W} \times 100(\%)$$

◆ Moisture content (Dry Base): M/D

Indicates percentage of the evaporated moisture mass vs. the mass after drying process. 999.99 % is the maximum value.

$$\frac{W-D}{D} \times 100(\%)$$

◆ Dry content (Dry Base): W/D

Indicates percentage of the mass before drying process vs. the residual mass after drying. 999.99 % is the maximum value.

$$\frac{W}{D} \times 100(\%)$$

◆ Mass: GRAM

Indicates the mass after drying process.

▽ Continued on next page

▽ Changing Moisture Analyzer Settings

Either of the following is selectable for the minimum value to be displayed.

- For mass: 0.001 grams or 0.01 grams
- For others: 0.1 % or 0.01 %

1 Start the menu.

MENU [PRoGRM]

The menu opens.



2 Select the measurement standard setting (UNIT) from the menu.

▲ ▼ [UNIT] → ENTER (The display currently selected.)



3 Select the type of value to be referenced.

▲ ▼ (Measurement standard selection.)

→ ENTER

Display	Description
[M,W]	Moisture content (Wet Base)
[D,W]	Dry content (Wet Base)
[M,D]	Moisture content (Dry Base)
[W,D]	Dry content (Dry Base)
[GRAM]	Mass









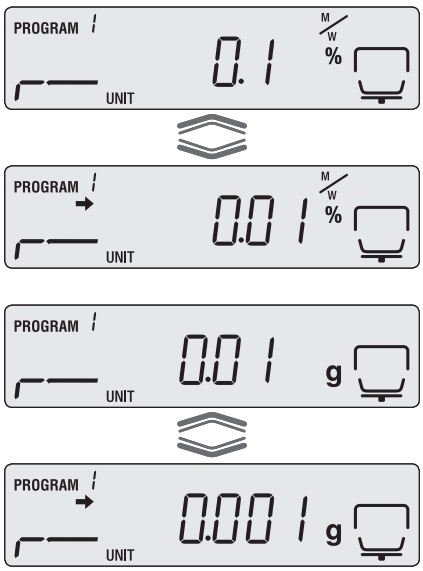


4 Select the minimum value to be displayed during measurement.

▲ ▼ (Unit selection) → ENTER

Press ESC to display the step 1 screen. Press ESC again to return to the standby state.

Display selected in step 3	Selectable units
[M/W] [D/W] [M/D] [W/D]	[0.1] or [0.01] (in %)
[GRAM]	[0.001] or [0.01] (in grams)



▽ Continued on next page

▽ Changing Moisture Analyzer Settings

Setting the Method to Start Measurement

Select the method to start measurement from the following two types.

- Easy: Place a sample and close the heater cover, and the measurement will start automatically.
  You can quickly start the measurement without pressing START.
- Normal: Press START to start the measurement manually. You can start the measurement even with the heater cover open. This is useful when you measure the weight of a volatile sample before it is dried.

1 Start the menu.

MENU [PRoGRM]



The menu opens.

2 From the menu, select the method to start measurement.

▲ ▼ [START] → ENTER (The method to start measurement currently selected.)

The methods are switched each time ENTER is pressed

Option	Method	Description
➡ When shown	Easy	Measurement starts automatically when the heater cover is closed
When hidden	Normal	Press START and start measurement manually

If the stability mark is shown while [EASY] appears, the Easy method is set.





If the stability mark is hidden while [EASY] appears, the Normal method is set.

Setting Sample Codes

Set sample codes to identify the sample (object) from output measurement results.
The sample code consists of four digits. The first and second digits allow "0 to 9", "- (hyphen)", "A to Z", or "_ (underscore)" to be entered, and the third and fourth digits only allow "0 to 9".
Sample code "0000" is set as default.

1 Start the menu.

MENU [PROGRM]

The menu opens.



2 Select the sample code setting (CoDE) from the menu.

▲ ▼ [CODE] → ENTER [0000]

A 4-digit number appears and the first digit flashes.





3 Enter a sample code.

▲ ▼ (Code input) → ▶ (Repeat for four digits) → ENTER [SET]

"How to Enter Dada", page 43









To shift the digit

Press ◀ ▶ to shift the digit.

Press ENTER to return to the standby state.

▽ Continued on next page

▽ Changing Moisture Analyzer Settings

Setting the Date and Time

Set the date and time to be output as a measurement result.
Select from the following the format to output the date. Use two digits to enter the year.

- YYMMDD: Year, Month, Day
- MMDDYY: Month, Day, Year
- DDMMYY: Day, Month, Year

1 Start the menu.

MENU [PROGRM]

The menu opens.



2 Select the date setting (DATE) from the menu.

▲ ▼ [DATE] → ENTER [YYMMDD]



3 Select the date format.

▲ ▼ [YYMMDD][MMDDYY][DDMMYY] →

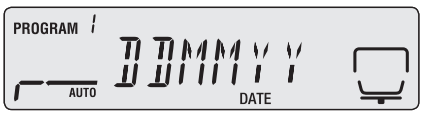
ENTER [(Date.)]

Select one of the following.

Display	Date format
[YYMMDD]	Year, Month, Day
[MMDDYY]	Month, Day, Year
[DDMMYY]	Day, Month, Year







4 Enter the year, month, and day.

▲ ▼ (Year, month, and day input.) → ENTER ▶

(Move to the next entry item.) → [(Time.)]

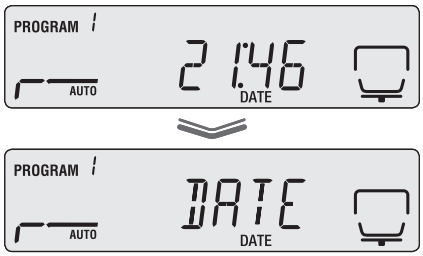
Enter the date in the format selected in step 3.
Press ENTER to save the settings and move to the next item. Press ▶ to move to the next item.



5 Enter the hour and minute.

(Hour and minute input.) → ENTER

Press ENTER to save the settings and move to the next item. Press ▶ to move to the next item. When the time does not need to be changed, press ESC to return to the standby state (measurement display).



6 Return to the standby state.

Press ESC or ◀ to return to the standby state.



Restricting the Menu Display

Restrict the menu display so that the moisture analyzer settings cannot be changed without authorization. To cancel the restriction, take the same procedure.

The following functions are available when the menu is restricted.

- "Measuring Moisture Content", page 44
- "Restricting the Menu Display" This page
- "Printing Stored Measurement Data" page 93

For further information on the menu to be displayed, see "Menu Map" (page 115).

1 Start the menu.

MENU [PROGRM]

The menu opens.



2 Select the restriction of menu display (LoCK) from the menu.

▲ ▼ [LoCK] → ENTER [PASS]





▽ Continued on next page

▽ Changing Moisture Analyzer Settings

3 Enter the password.

(Password input.) → (Repeat for four digits.) → ENTER [oK]

Press ◀ ▶ to shift the digit.

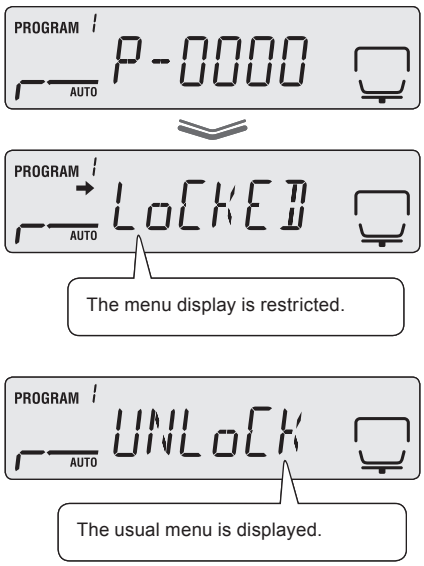
"How to Enter Data", page 43

The restriction of menu display is switched on or off.

When "LoCK" is displayed, press ESC to return to the standby state (measurement display).

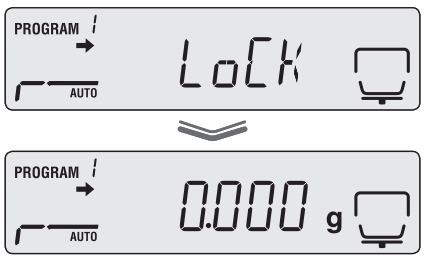
If [NG] is displayed

The entered password is not correct. Repeat the procedure from step 1.



4 Return to the standby state.

Press ESC or ◀ to return to the standby state.



Setting the Password

Restrict the menu display by setting the password. The password consists of four digits, and each digit allows "0 to 9" to be entered.

Password "9999" is set as default.

1 Start the menu.

MENU [PRoGRM]

The menu opens.



2 Select the password setting (PASS) from the menu.

▲ ▼ [PASS] → ENTER [P-9999]

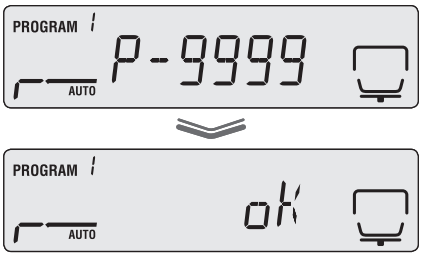


3 Enter the password.

(Password input.) → (Repeat for four digits.) → ENTER [oK]

Press ◀ ▶ to shift the digit.

"How to Enter Data", page 43



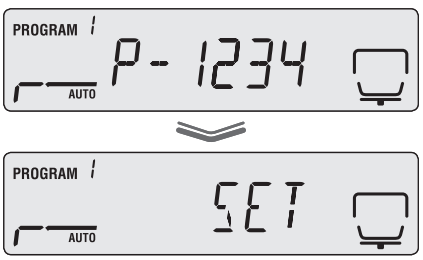
> **If [NG] is displayed**
>
> The entered password is not correct. Repeat the procedure from step 1.

4 Enter a new password.

(Password input) → (Repeat for four digits.) → ENTER [SET]

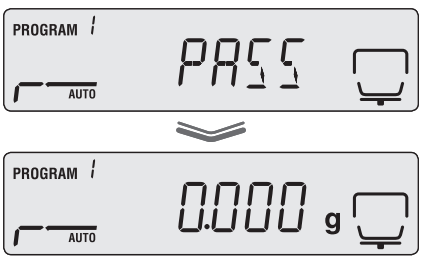
Press ◀ ▶ to shift the digit.

"How to Enter Data", page 43



5 Return to the standby state.

When "PASS" is displayed, press ESC to return to the standby state (measurement display).



▽ Continued on next page

Setting the Moisture Analyzer ID

To use several MOC63u moisture analyzer units, set the moisture analyzer IDs, so that you can identify which unit is responsible for measured data when you check the data.
The ID consists of four digits, and each digit allows "0 to 9", "- (hyphen)", "A to Z", or "_ (underscore)" to be entered.
ID "0000" is set as default.

1 Start the menu.

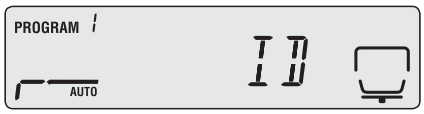
MENU [PROGRM]

The menu opens.



2 Select the ID setting (ID) from the menu.

▲ ▼ [ID] → ENTER





3 Enter the ID.

▲ ▼ (ID input.) → ▶ (Repeat for four digits.) → ENTER [SET]

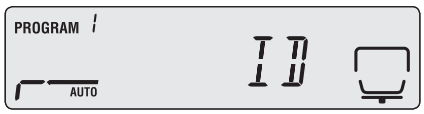
Repeat the above procedure for four digits.
Press ◀ ▶ to shift the digit.





4 Return to the standby state.

Press ESC or ◀ to return to the standby state.





Calibrating Moisture Analyzer

Span calibration can be performed to ensure accurate measurements by the moisture analyzer. Periodical calibration is recommended to ensure more accurate measurement results.

The following two types of calibrations are provided for the moisture analyzer.

- Span calibration
- Calibrating the temperature (Option)

Span Calibration

For accurate measurement of the moisture analyzer, span calibration by using a weight.

The calibration result can be recorded if a printer is connected in advance.

☞ "Printer Output (Option)", page 91

For further information on the span calibration procedure, in "The Span Calibration after Installing the Moisture Analyzer" (☞ page 40).

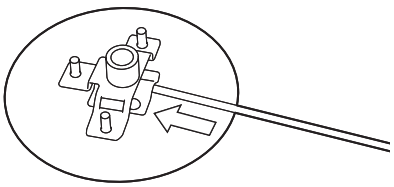
Calibrating the Temperature (Option)

To calibrate the temperature of the MOC63u moisture analyzer, the optional "Temperature Calibration Kit" is required. For further information on the temperature calibration kit, refer to the instruction manual attached to the kit.

The calibration record can be output automatically if a printer is connected in advance.

☞ "Printer Output (Option)", page 91

1 Insert the thermometer probe firmly into the temperature calibration kit.

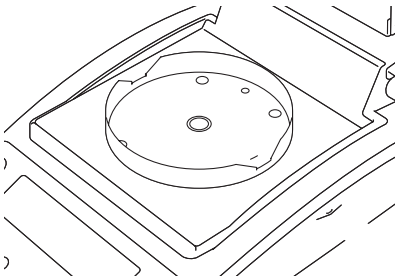


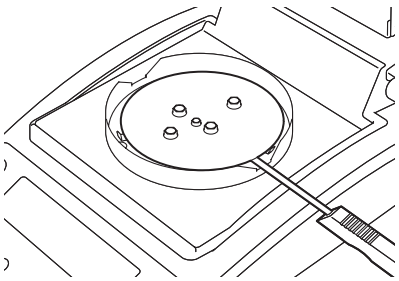
▽ Continued on next page

▽ Calibrating Moisture Analyzer

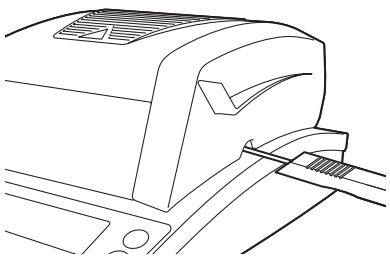
2 Open the heater cover of the moisture analyzer, take out the sample pan, and place holder of the temperature calibration kit assembled in step 1.

Align the hole in the holder hole with that in the Windbreak.





3 Close the heater cover, and check that the sensor probe fits the indentation in the heater cover.



4 Start the menu.

MENU [PRoGRM]

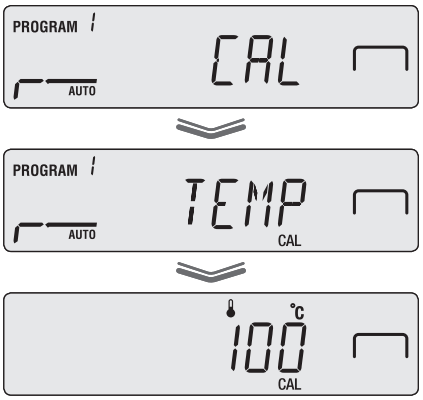
The menu opens.



5 Select the temperature calibration from the menu.

[CAL] → ENTER [BAL] → ▲ ▼

[TEMP] → ENTER [100°C]

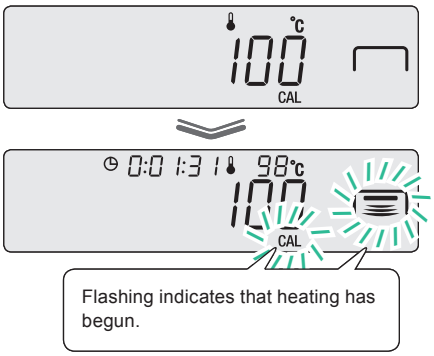


> **To calibrate the temperature correctly**
>
> Calibrate when the temperature of the moisture analyzer is the same as the temperature of the room.

6 Start heating at 100 °C.

START

A heating process begins.



> **What if you open the heater cover during the heating process…**
>
> It is dangerous to touch the heater cover and the inside of the cover during calibration as they become extremely hot. Basically, do not open the heater cover during temperature calibration. Otherwise, the temperature calibration may not be accurate. Should you be forced to open the cover, close the cover in less than a minute to continue the calibration process. When one minute has elapsed, "ERR.100" appears on the display panel and the calibration is interrupted.
>
> Press ESC to return to the [TEMP] mode.

▽ Continued on next page

▽ Calibrating Moisture Analyzer

7 When temperature indication (100 °C) flashes, enter the calibration temperature.

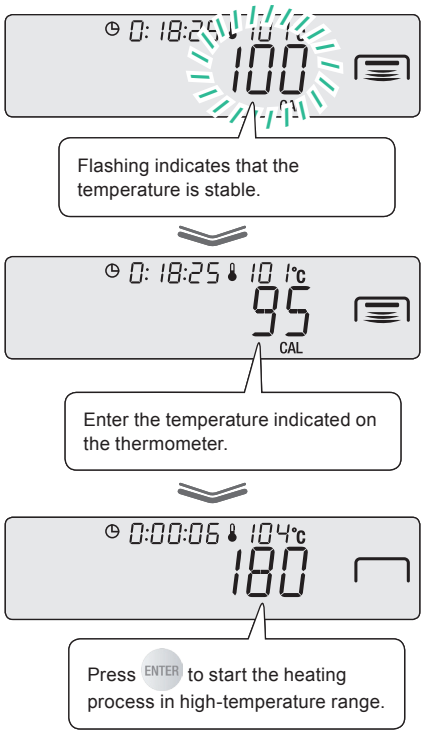
(Temperature input.) → ENTER

After 15 minutes has elapsed, the temperature indication flashes.

Enter the temperature (calibration temperature) indicated on the thermometer of the temperature calibration kit.

Press ENTER to start the heating process in high-temperature range.

> If it is left while the indicator is flashing…
>
> Finish entering the figure within 15 minutes after the indicator starts flashing. If it is not finished, [AboRT] will be displayed and the calibration will finish.



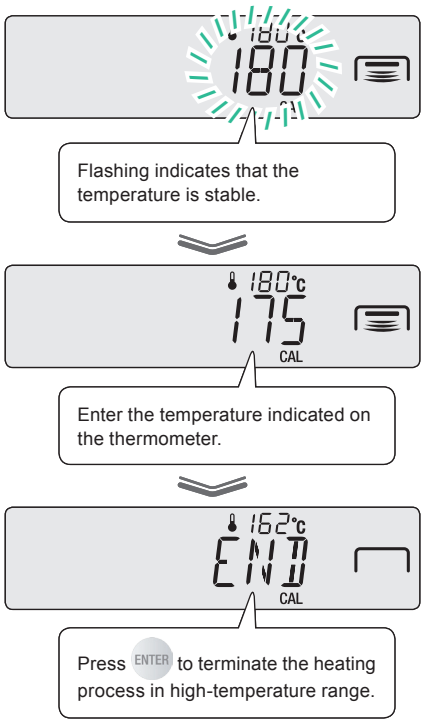
8 When temperature indication (180 °C) flashes, enter the calibration temperature.

After 15 minutes has elapsed, the temperature indication flashes.

When [END] is displayed, the temperature calibration terminates, and the moisture analyzer returns to the standby state after a short period of time.

(Temperature input.) → ENTER

> If it is left while the indicator is flashing…
>
> Finish entering the figure within 15 minutes after the indicator starts flashing. If it is not finished, [AboRT] will be displayed and the calibration will finish.



Output of calibration record

1 Start the Menu.

MENU [PROGRM]

The menu opens.



2 Select the temperature calibration record from the menu.

▲ ▼ [CAL] → ENTER [BAL] → ▲ ▼

[CALREC] → ENTER (Outputs the currently selected calibration record.)

The calibration record output is switched each time ENTER is pressed.





Option	Description
➡ When shown	Calibration record The record is output.
When hidden	Calibration record The record is not output.

For the data output of temperature calibration record, see "Output Data" (page 95).

3 Return to the standby state.

Press ESC to return to the standby state.



4 CONNECTION TO PERIPHERALS

When Connecting MOC63u to Peripheral Devices

When the MOC63u moisture analyzer is connected to a PC and a printer, the following functions are available:

- Display the moisture analyzer data in an application of the PC.

"Using Windows Direct Function", page 79

- Control the moisture analyzer using command codes issued by the PC.

"Control Moisture Analyzer from PC", page 85

- Output the measurement result and the settings of the moisture analyzer to a printer.

"Printer Output (Option)", page 91

Using Windows Direct Function

Values shown on the moisture analyzer display can also be shown in any Windows application (such as Microsoft Excel or the mass entry window of an analyzer). A value transferred from the moisture analyzer is automatically entered in the cursor position of an application like the keyboard entry.

If keyboard entry is enabled, data can be obtained directly from the moisture analyzer.

"Displaying the Measurement Result in the Windows System", page 83.

Differences depending on the OS used

- When the Windows XP operating system (OS) is running, you can use the Windows Direct Function without using special connection and transfer applications.
- However, the dedicate tools are required to use the Windows Direct Function on the Windows Vista or Windows 7 OS. For further information, refer to our Web site (http://www.shimadzu.com/products/balance/index.html).

* The moisture analyzer may not operate normally in certain environments with Windows XP. In that case, optional tools may be required.

If you have a problem …

- If communication software is already installed on the PC, the Windows Direct Function is not used even when the PC is running on the Windows OS.

When using the dedicate printer and the Windows direct function simultaneously

- Attach the dedicate printer to the DATA I/O connector of the analyzer. Then, attach the PC to the USB connector of the analyzer. For the connection of dedicate printer, see "Printer Output (Option)" (page 91).

Enable the Windows Direct Function

The Windows Direct Function must be set at both the moisture analyzer and on the Windows system.

- "Setting the Windows Direct Function on the moisture analyzer" (page 80)
- "Setting the Windows Direct Function on the Windows system" (page 80)

▽ Continued on next page

▽ Using Windows Direct Function

◆ Setting the Windows Direct Function on the moisture analyzer

Select the following settings, and all communication options will be set appropriately for the Windows Direct Function.

1 Start the menu.

MENU [PRoGRM]

The menu opens.



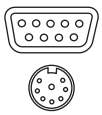
2 Select the output setting (CoM.SET) from the menu.

[CoM.SET] → ENTER

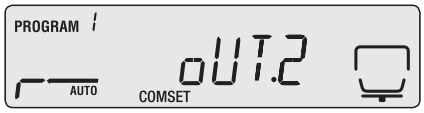


3 Select an output port.

[oUT.1][oUT.2] →

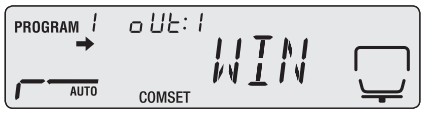
Output port selection	Output port	
oUT.1	Serial connection (RS-232C or DATA I/O)	
oUT.2	USB	





4 Set the output to the Windows.

[WIN] → ENTER



◆ Setting the Windows Direct Function on the Windows system

The Windows Direct Function must also be set on the Windows system to allow data transmission between the Windows system and the moisture analyzer. For further information, refer to the following Web site:

http://www.shimadzu.com/products/balance/index.html

Connecting the Windows System and the Moisture Analyzer

The following two ways are available for connecting to the Windows system:

- "Connection via the RS-232C cable" (☞ page 81)
- "Connection via the USB cable" (☞ page 82)

◆ Connection via the RS-232C cable

Use the following procedure to connect the moisture analyzer to the Windows system (the PC) via the RS-232C interface cable.

1 Turn the power off.

☞ "Turning Power Off", page 50

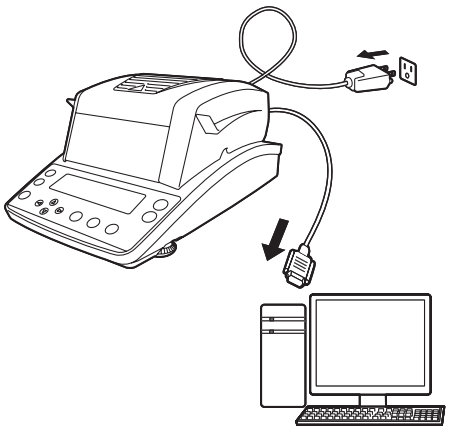
2 Unplug the power cable from receptacle.

3 Plug the RS-232C cable into the RS-232C connector at the rear of the moisture analyzer.

Tighten and secure the setscrews.

4 Connect the RS-232C interface cable to the PC.

Tighten and secure the setscrews.



▽ Continued on next page

▽ Using Windows Direct Function

◆ Connection via the USB cable

Use the following procedure to connect the moisture analyzer to the Windows system (the PC) using the USB cable.

1 Turn the power off.

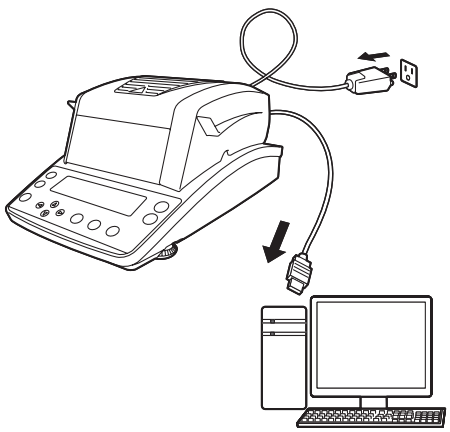
☞ "Turning Power Off", page 50

2 Unplug the power cable from receptacle.

3 Plug the USB cable into the USB connector at the rear of the moisture analyzer.

4 Install the USB driver software on the PC by following the on-screen instructions.

5 Connect the USB cable to the PC.



Displaying the Measurement Result in the Windows System

Use the following procedure to display the measurement results in the Excel running on the Windows system. The results can also be displayed using the Notepad or other programs.

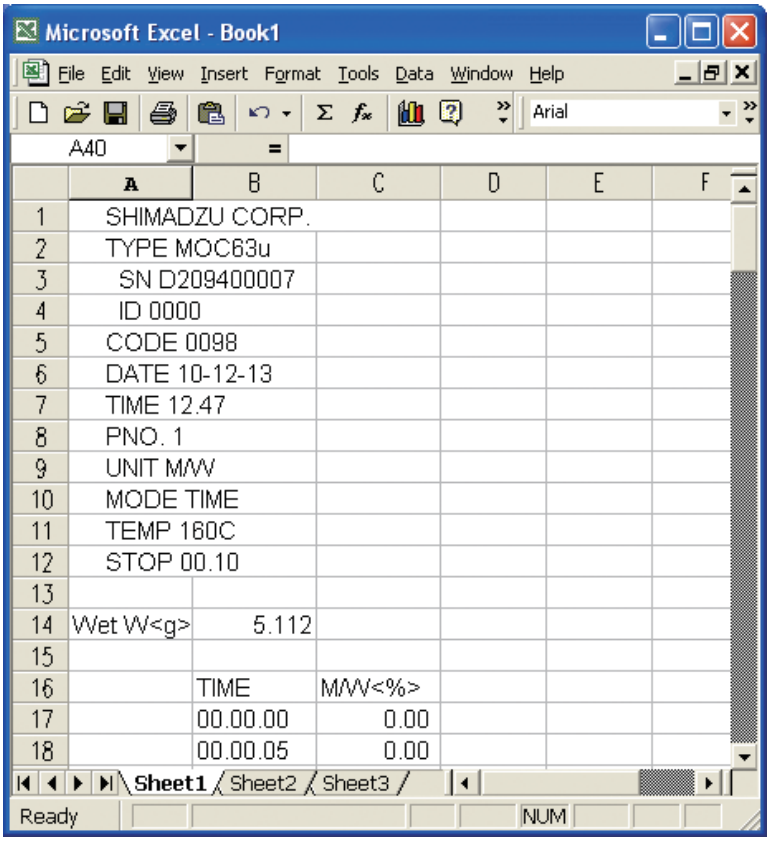
1 Turn on the power switch of the moisture analyzer.

"Turning the Power On", page 38

2 Start the Excel on the Windows system.

3 Press START

The moisture analyzer data is displayed on the Excel.



▽ Continued on next page

If the Windows Direct Function does not Work Well

If the Windows Direct Function does not work well, check the following points.
If the problem continues, contact an authorized Shimadzu representative.

Q1	**I have set the Windows Direct Function, but it does not work!**
A1	● Check the communication cable type (the Shimadzu's genuine parts or a commercial cable) and check its connection status. ● If you are using a USB-to-serial port converter, the COM number may have been set to a number greater than 4. Change the COM number to a usable number (COM1 to COM4) using the serial key device. For further information on the COM number check and modification, refer to our Web site (http://www.shimadzu.com/products/balance/index.html). ● The USB-to-serial port converter driver may have failed to set up correctly. Uninstall the driver first, and then reinstall it on the PC. ● The notebook may have been set to disable the RS-232C port for power saving. Be sure to enable the RS-232C port before this setup. ● Communications with other applications and PCs via a LAN may interfere with the serial key device settings. Try using WindowsDirect communication without using the LAN. ● The moisture analyzer may not operate normally in certain environments with Windows XP. In that case, optional tools may be required. For further information, refer to our Web site (http://www.shimadzu.com/products/balance/index.html).
Q2	**When I restart the PC, the Windows Direct Function does not work!**
A2	● Some PCs may not recognize the serial key device settings during startup. For further information on solutions, refer to our Web site (http://www.shimadzu.com/products/balance/index.html).
Q3	**I want to use the Windows Direct Function on the Windows Vista or Windows 7 system!**
A3	● The serial key device setup window, required for Windows Direct Function setting, is not displayed when the PC is running on the Windows Vista or 7 OS. You can download an alternate serial key device tool from our Web site (http://www.shimadzu.com/products/balance/index.html). Install the downloaded tool on your PC. For further information on the setup procedure, refer to our Web site (http://www.shimadzu.com/products/balance/index.html).
Q4	**Garbled data is entered in the PC!**
A4	● The Windows Direct Function is not set on the moisture analyzer or on the PC. See "Enable the Windows Direct Function" (☞ P. 79) and set up this function.
Q5	**When I enter data in the Excel, the cursor does not move into the next cell!**
A5	● Disable the 2 byte characters conversion function of the Windows system. ● In Excel, select [Options] from the [Tools] menu, and click the [Edit] tab in the [Options] dialog box. Then, make sure the [Move selection after Enter] box is checked (it is OK if moved to another cell). ● Check the entry data in another application (such as the Notepad).
Q6	**The PC operation sometimes becomes unstable.**
A6	● When the processing speed of the PC is insufficient, it may malfunction. Set the interval of data transmission from the moisture analyzer longer. ● When the moisture analyzer is sending data to the PC, do not touch its keyboard and mouse.

Control Moisture Analyzer from PC

The moisture analyzer can be controlled from the PC. The programming using command codes (page 89) is required for it.

Setup and Use of the Communication Tool

To control the moisture analyzer from the PC, you need to setup and use the special communication tool.
For further information on the communication tool, refer to the following Web site:
http://www.shimadzu.com/products/balance/index.html

1 Start the menu.

MENU [PRoGRM]



The menu opens.

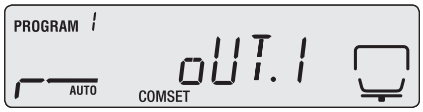
2 Select [CoM.SET] from the menu.

▲ ▼ [CoM.SET] → ENTER [oUT.1]



3 Select an output port.

▲ ▼ [oUT.1] [oUT.2] → ENTER [WIN]



4 Set a baud rate.

Option	Description
B1200	1200baud
B2400	2400baud
B4800	4800baud
B9600	9600baud
B19.2k	19200baud
B38.4k	38400baud



What is the baud rate?

Baud rate is a communication speed to transfer the measurement result from the moisture analyzer to a serially connected printer.
More information can be transferred at a higher baud rate.

▽ Continued on next page

▽ Control Moisture Analyzer from PC

What are the WIN settings…

Certain Windows settings are required to use the Windows Direct Function. For details, see "Enable the Windows Direct Function" (☞ page 79).

4 Set the parity.

(Select parity bit setting.) → ENTER

(Currently selected stop bit.)

Select any of the following parity bit settings.

Option	Description
P.NoNE	Skips parity setting. (eight bits long)
P.oDD	Sets an odd parity. (seven bits long)
P.EVEN	Sets an even parity. (seven bits long)







What is the parity bit?

When the measurement result data is transferred from the moisture analyzer to a printer, parity bits are added to this data so that a transmission data error can be detected.

5 Set the stop bit.

(Select a stop bit.) → ENTER (Currently selected handshaking.)

Display	Stop bit
SToP.1	One bit
SToP.2	Two bit





What is the stop bit?

When the measurement result data is transferred from the moisture analyzer to a serially connected printer, the stop bit is finally sent to identify the end of data transmission.

6 Set the handshaking.

(Select a handshaking.) → ENTER

(Currently selected delimiter.)

When you use the EP-80 or EP-90 printer, be sure to select the "HS.HW" handshaking.

Option	Description
HS.HW	Sets the hardware handshaking.
HS.SW	Sets the software handshaking.
HS.TIM	Sets the timer handshaking.
HS.oFF	Skips the handshake setting.









What is the handshaking?

This is the transmission shutdown and restart control method to be used when measurement result data is transferred from the moisture analyzer to the PC.

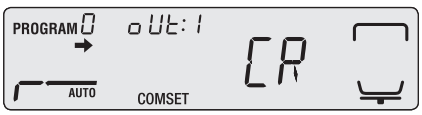
When an output port is not in use …

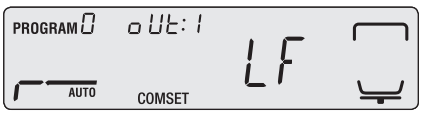
If you set the handshaking for an output port that is not in use, the output timing may be delayed at ports currently being used. To maintain the preset timing, set the handshaking setting to "HS.oFF" at the output port that is not in use.

7 Set a delimiter.

(Select a delimiter.) → ENTER

Option	Description
CR	Feeds a line, ASII code 0DH
LF	Returns a line, ASII code 0AH
CR + LF	Feeds a line and returns.







What is the delimiter?

This is a character used to delimit the data that is transferred from the moisture analyzer to the PC.

▽ Continued on next page

▽ Control Moisture Analyzer from PC

How to Use the Command Codes

You can use command codes to control the MOC63u moisture analyzer from the PC. The following explains how to use the commands.

Command acceptance

When the PC outputs a command, the "COM ERR" message may be displayed and the command may be rejected by the moisture analyzer according to its conditions.

◆ A command ending with a digit, a character, or a symbol other than Equal (=) sign

A delimiter (C/R = ASCII code 0DH) is added after each command code, and this code is sent to the moisture analyzer.

Example 1:

Input command code	Command code to be sent	Result
ID	ID(C/R)	The moisture analyzer ID is read and displayed.

◆ A command ending with an Equal (=) sign

Enter an argument after each command code, and this code is sent to the moisture analyzer with a delimiter in the end.

Example 2:

Input command code	Command code to be sent	Result
ID=1234	ID=1234(C/R)	The moisture analyzer ID is set to "1234".

◆ Echo back command

A string consisting of "n" characters, which begins with an echo back command "{" and ends with a delimiter, is retransmitted from the moisture analyzer. ("N≤30" if the queued commands do not remain in the receive buffer of the moisture analyzer.)

Example 3:

Input command code	Command code to be sent	Result
{ABCDEFG12345	{ABCDEFG12345(C/R)	When the moisture analyzer receives this command, it outputs "ABCDEFG12345(C/R)".This character string (or any character string) can be printed out on a printer if connected.

Command Code List

When controlling the MOC63u moisture analyzer from the PC, the following commands are available:

◆ Data output

Command	Function
D05	Single time output
TEMP	Temperature Single time output

◆ Key operations

Command	Function	Command	Function	Command	Function
POWER	Press	UP	Press	ESC	Press
MENU	Press	DOWN	Press	START	Press
LEFT	Press	ENTER	Press	STOP	Press
RIGHT	Press	TARE	Press		

◆ System control

Command	Function
ID=xxxx	Sets an ID (consisting of 4 alphanumeric characters).
ID	Reads the ID.
STATE	Outputs all function settings.

◆ Span calibration

Command	Function
ECAL	Calibrates the span (externally).
ECAL.W = xxx.xxx	Sets the standard calibration weight (where, "xxxx.xxx" is 9.5 grams or more).
GLP0 GLP1	GLP0:GLP output OFF GLP0:GLP output ON

◆ Others

Command	Function
"_" (space)	Clears the buffer.
{?????????	Selects the Echo Back mode (where, "?????" are any alphanumeric characters).

▽ Continued on next page

▽ Control Moisture Analyzer from PC

Cable Tie

◆ IBM PC/AT, DOS/V, for AX series PC (D-sub9 pin) (straight cable ties)

PC side			MOC63u side	
RXD	2	———	2	TXD
TXD	3	———	3	RXD
DTR	4	———	4	DSR
SG	5	———	5	SG
DSR	6	———	6	DTR
RTS	7	⌐ ⌐	7	CTS
CTS	8	⌐ ⌐	8	RTS
NC	9		9	

Printer Output (Option)

Connect a printer to the MOC63u moisture analyzer to output the measurement and calibration results to the printer.

Connecting a Dedicated Printer

Any of the following printers can be connected to the DATA I/O port of the MOC63u moisture analyzer.

- EP-80
- EP-90 (The DATA key and other buttons are not enabled.)

For further information on the dedicated printer operations, refer to the printer instruction manual.

When you do not use a printer, turn off the power and disconnect the cable.

1 Turn the power off.

"Turning Power Off", page 50

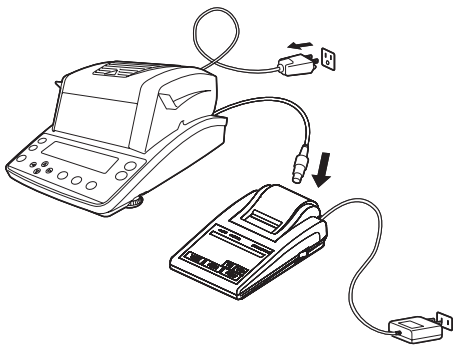
2 Unplug the power cable from receptacle.

3 Plug the DATA I/O cable into the DATA I/O connector at the rear of the moisture analyzer.

4 Connect the DATA I/O cable to the dedicated printer.

When turning the power switch on…

First, turn on the power switch of the moisture analyzer. Otherwise, the printer may malfunction.



▽ Continued on next page

▽ Printer Output (Option)

Setting the Printer Output Method

Use the following procedure to set up the measurement result output to the printer.

1 Start the menu.

MENU [PRoGRM]



The menu opens.

2 Select [CoM.SET] from the menu.

[CoM.SET] → ENTER [oUT.1]



3 Select an output port.

[oUT.1] → ENTER [WIN]

4 Set each option.

The parameters shown at right will be set.

Setting item	Description
Baud rate	B.1200
Parity bit	P.NoNE
Stop bit	SToP.1
Handshaking	HS.HW
Delimiter	CR

Setting a Measurement Data Printout Timing

You can set a time when the current measurement data is output from the printer.

1 Start the menu.

MENU [PRoGRM]



The menu opens.

2 Set a data output timing from the printer.

[PRINT] → ENTER →

[INTVL] → ENTER →

(Select a timing.) → ENTER

You can select one of the following timings.

Option	Description
oFF	Does not output data during measurement.
1SEC	Outputs data every one second.
2SEC	Outputs data every two seconds.
5SEC	Outputs data every five seconds.
10SEC	Outputs data every 10 seconds.
30SEC	Outputs data every 30 seconds.
1MIN	Outputs data every one minute.
2MIN	Outputs data every two minutes.
5MIN	Outputs data every five minutes.
10MIN	Outputs data every 10 minutes.
FINAL	Outputs data when the measurement has completed.

Printing Stored Measurement Data

The moisture analyzer saves the measurement results automatically. You can manually output any of the moisture analyzer data saved in the memory to a printer.
For further information on clearing the stored measurement data, see "Clearing Measurement Data from Memory" (☞ page 105).

1 Connect a printer to the moisture analyzer.

☞ "Connecting a Dedicated Printer", page 91.

If the number of measured data sets exceeds 100…

The oldest data is overwritten by new data.

2 Turn the printer power switch on.

For further information on turning the printer power on, refer to the printer instruction manual.

3 Start the menu.

MENU [PRoGRM]

The menu opens.

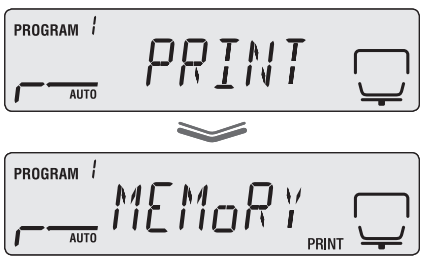


4 Output the memory data from the printer.

[PRINT] → ENTER →

[MEMoRY] → ENTER

The measurement result is output from the connected printer.
A short peep sounds at the end of memory data output.



▽ Continued on next page

▽ Printer Output (Option)

How can I abort the measurement data output…

Press ESC.

5 Return to the standby state.

Press ESC to return to the standby state.



Outputting the Moisture Analyzer Settings from a Printer

You can output the current settings of the MOC63u moisture analyzer to a printer.
For further information on initializing the current settings, see "Initializing Moisture Analyzer Settings" (☞ page 106).

1 Connect a printer to the moisture analyzer.

☞ "Connecting a Dedicated Printer", page 91.

2 Turn the printer power switch on.

For further information on turning the printer power on, refer to the printer instruction manual.

3 Start the menu.

MENU [PRoGRM]

The menu opens.

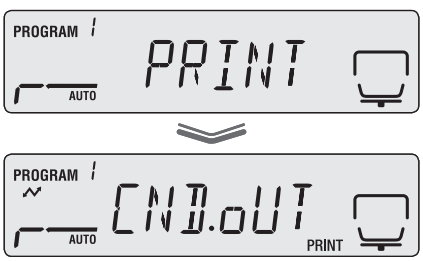


4 Output the moisture analyzer settings from the printer.

[PRINT] → → ENTER

[CNDoUT] → ENTER

The current settings are output from the connected printer.



5 Return to the standby state.

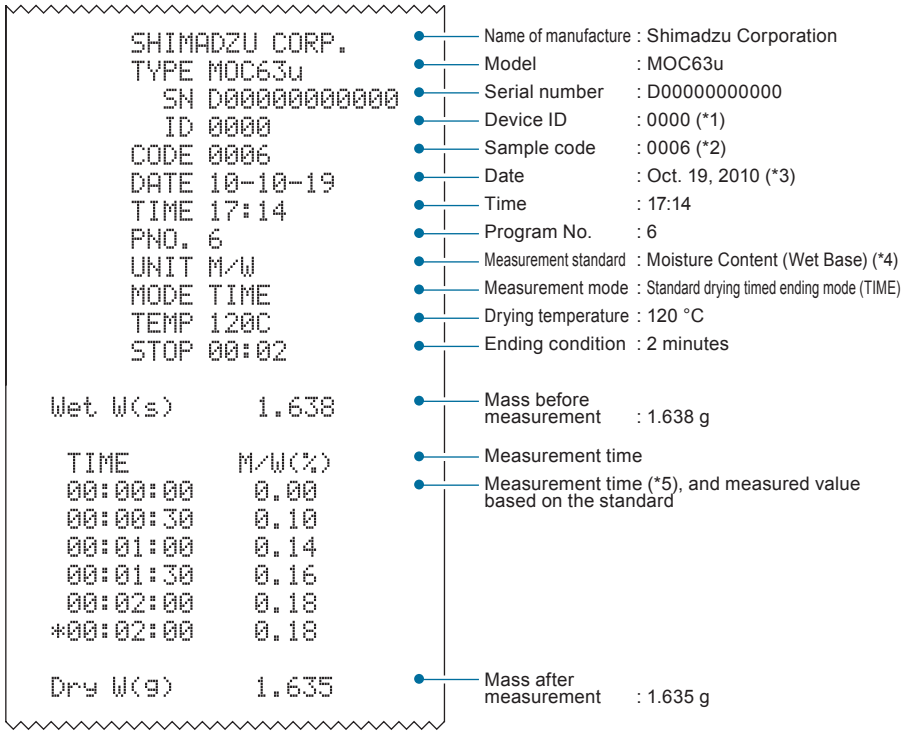
Press ESC to return to the standby state.



Output Data

The following explains the calibration and measurement result output from the printer.
When a printer and a PC are used as an output device, and the Windows Direct Function is set, the time measurement result is printed with a period instead of a colon.

◆ Measurement result output example

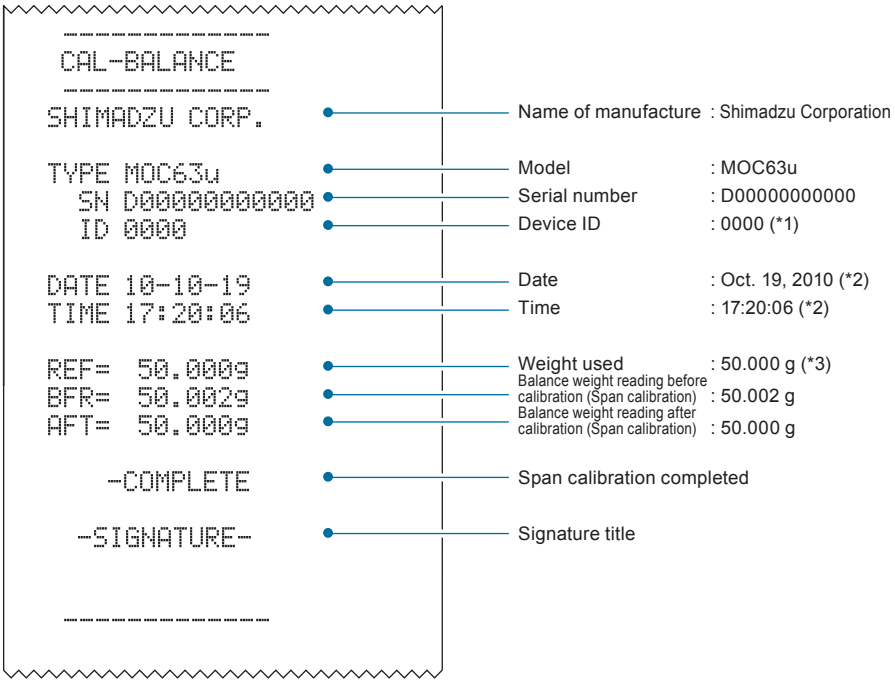


*1 Variable value "Setting the Moisture Analyzer ID", page 72
*2 Variable value "Setting Sample Codes", page 67
*3 Variable value "Setting the Date and Time", page 68
*4 Variable value "Setting the Measurement Standard", page 63
*5 Variable measurement interval "Setting the Printer Output Method", page 92

▽ Continued on next page

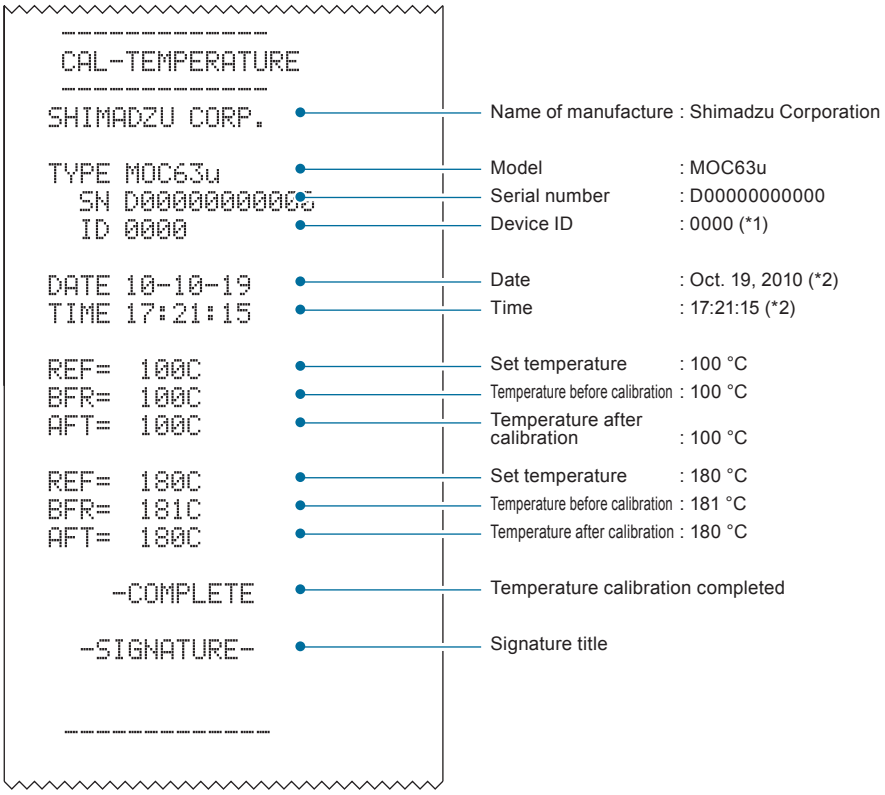
▽ Printer Output (Option)

◆ Span calibration output example



*1 Variable value ☞ "Setting the Moisture Analyzer ID", page 72
*2 Variable value ☞ "Setting the Date and Time", page 68
*3 Variable value ☞ "The Span Calibration after Installing the Moisture Analyzer", page 40

◆ Temperature calibration output example



*1 Variable value ☞ "Setting the Moisture Analyzer ID", page 72

*2 Variable value ☞ "Setting the Date and Time", page 68

Maintenance of Moisture Analyzer

⚠CAUTION

Instructions

Unplug power cord from receptacle before servicing.

If the power cord is being plugged into receptacle, you may be shocked during servicing.

Prohibitions

Start the service only after the heater and the heater cover have cooled down.

If they are hot, you may burn yourself.

Sample pan

You can remove the sample pan from the moisture analyzer, and wash it in the water.
Dry the pan well and place it on the pan supporter.



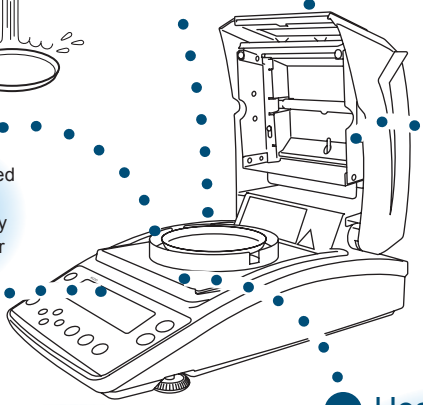
Main unit

Wipe and clean the main body with a soft cloth moistened with a small amount of mild detergent.



Windbreak

The windbreak can be detached from the heater insulate plate to be washed. Dry it thoroughly before installing it to the heater insulate plate.



Glass case

Carefully remove the glass case (☞ page 99), and wipe and clean it with a soft cloth moistened with a small amount of mild detergent.

Display panel and keys

Do not use organic solvents and chemicals. Also, do not use a chemical dust cloth. They may damage the paint surface and the display panel.

Heater insulation plate

The heater insulate plate can be detached from the main unit to be washed. Dry it thoroughly before installing it to the main unit.

Removing the Glass Case

To clean the glass case, carefully remove it from the moisture analyzer.

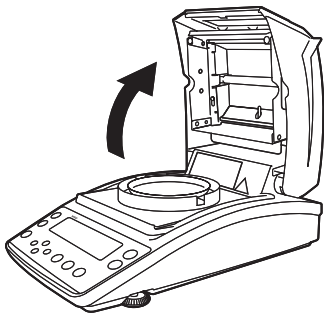
⚠CAUTION

Prohibitions

Do not directly touch the heater or the sensor.

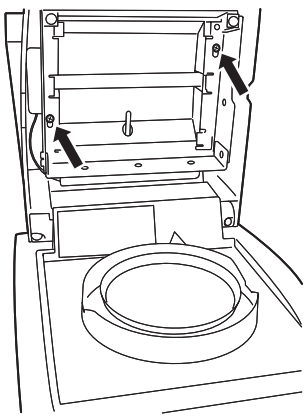
Doing so may shorten the service life of the heater or result in malfunction.

1 Open the heater cover.



2 Loosen two setscrews shown by arrows.

Use the SB2.5 (M3) hex wrench in the accessory kit.

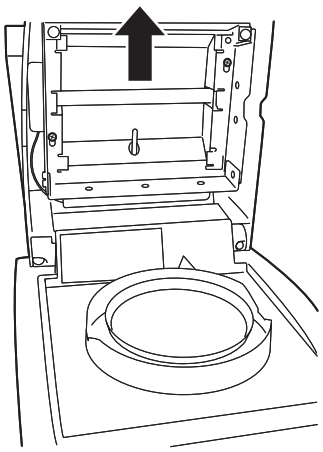


▽ Continued on next page

▽ Maintenance of Moisture Analyzer

3 Detach the glass case.

Slide the glass case to remove it through the wider opening of the glass case hole.



⚠CAUTION

Prohibitions

Do not touch broken glass with your bare hands.

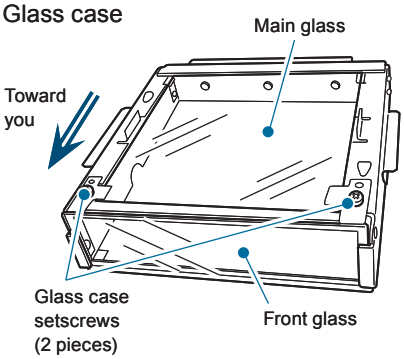
If the glass case is broken, be sure to handle the broken glass carefully so that you do not get injured.

Place the glass case on a flat surface and clean it carefully.

When replacing the glass…

Remove two setscrews as shown, and remove the front glass by sliding it upward. Then, remove the main glass by sliding it toward you.

Glass case



Installing the Glass Case

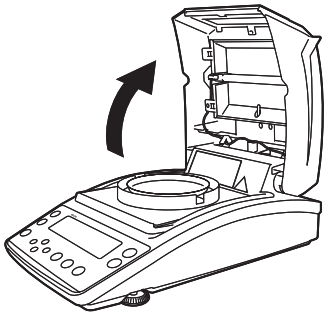
After you have cleaned the glass case and replaced the heater, install them on the moisture analyzer.

"Replacing Heater", page 102

Handle the heater leads carefully.

Take care not to pinch the heater leads by the heater cover when installing the glass case.

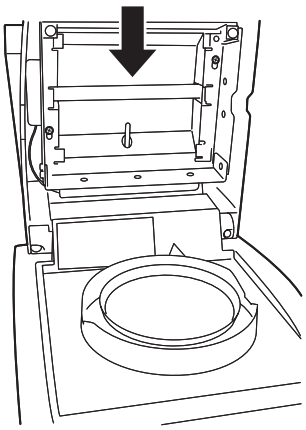
1 Open the heater cover.



2 Install the glass case on the moisture analyzer.

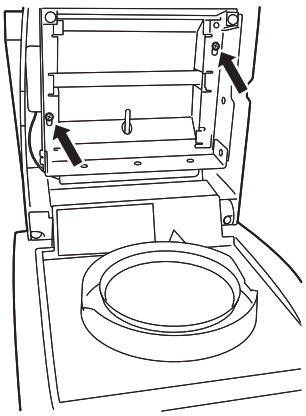
Face the hole of glass case upward, and slide the case down from the heater cover.

Place the screws where the glass case was removed through the wider opening of the glass case hole by following the step 3 described in "Removing the glass case" (Page 100), slide in the glass case to the bottom, and securely install it.



3 Securely tighten the two screws (placed in step 3) indicated by the arrows in the figure at right.

Use a hexagonal wrench SB2.5 (M3).



Replacing Heater

When the heater has deteriorated or when the heating unit needs to be replaced due to the blow of lamp, replace the heater with a new one.

Use the following heater replacement procedure.

⚠ WARNING

Instructions

Pull out the power cable from a receptacle. Otherwise, you may receive an electric shock.

⚠ WARNING

Instructions

Start the service only after the heater and the heater cover have cooled down. Doing so may result in a burn injury.

Service life of heater

The halogen heater of the moisture analyzer deteriorates or its lamp may blow after approximately 5,000 hours although it depends on the application conditions of the moisture analyzer.

If you have replaced the heater…

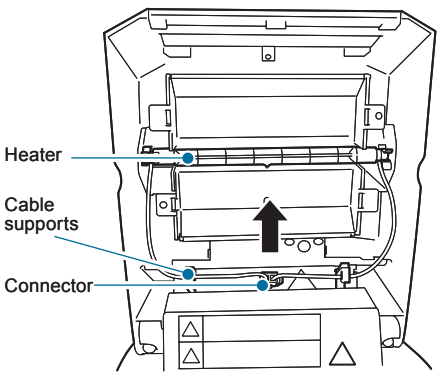
The heater output may change. We recommend that you calibrate the temperature (☞ page 73).

1 Remove the glass case.

☞ "Removing the Glass Case", page 99

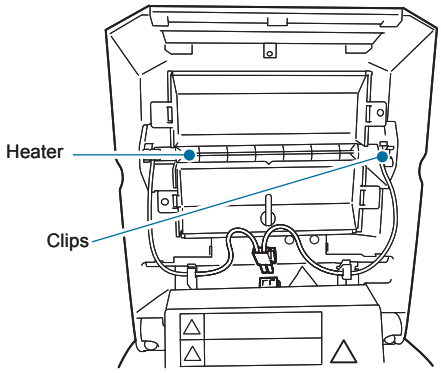
2 Unplug the connector of the used heater cable.

3 Pull out the cables through the cable supports.

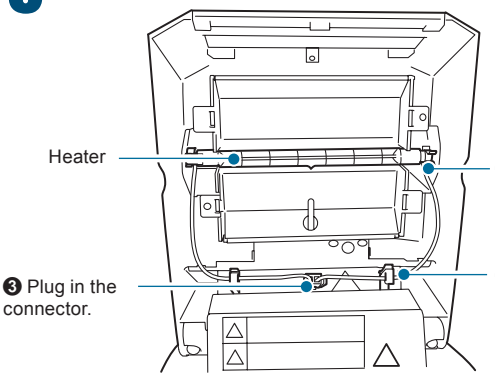


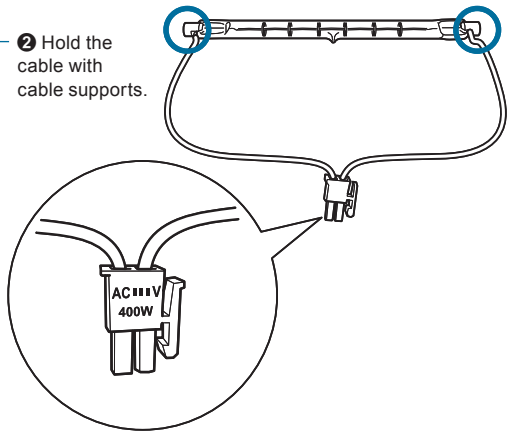
4 Remove the heater from the clips.

Hold the prongs (indicated with circles in the figure at right) located on both sides of the heater, and detach them form the clips.



5 Install a new heater.





❶ Install the heater using the clips.

❷ Hold the cable with cable supports.

❸ Plug in the connector.

6 Install the glass case on the moisture analyzer.

"Installing the Glass Case", page 101

⚠CAUTION

Prohibitions	Do not touch the glass part of the heater when installing the heater on the clip. Doing so may shorten the service life of the heater.
Instructions	Face the connectors in the correct direction. Plug the connectors into sockets in the correct direction as shown above.

Replacing Fuses

⚠CAUTION

Instructions

Before replacing fuses, turn the power switch of the moisture analyzer OFF, and remove the power plug from the socket.

Otherwise you could sustain an electric shock.

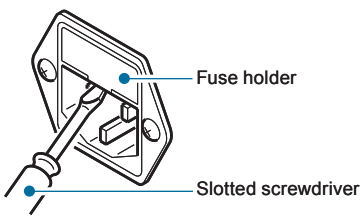
Prohibitions

Do NOT use any fuse other than those specified.

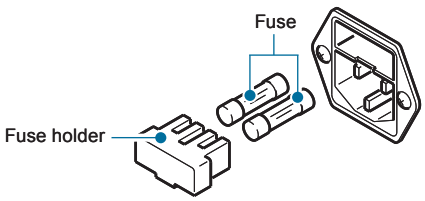
Doing so could cause a fire or short-circuit.

When replacing fuses, be sure to use the fuse written in the "Accessories".

1 Hook the fuse holder with a slotted screwdriver, and pull it toward you.

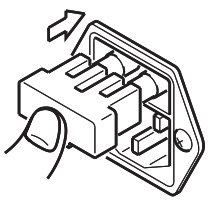


2 Remove the fuses from the fuse holder.



3 Insert new fuses in the fuse holder.

4 Press the fuse holder all the way seated in.



Clearing Measurement Data from Memory

You can clear the measurement data from memory.
Once cleared, it cannot be recovered.

1 Start the menu.

MENU [PRoGRM]

The menu opens.



2 Select the Clear Memory option (MEM.CLR) from the menu.

▲ ▼ [MEMCLR] → ENTER [CLR.oK?]





3 Start to clear memory.

ENTER → [END] → [MEMCLR]

The measurement data is cleared from memory of the moisture analyzer.







4 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.



Initializing Moisture Analyzer Settings

The moisture analyzer can be initialized to the factory defaults.
All programs are initialized. Therefore, no specific program numbers can be initialized.

1 Start the menu.

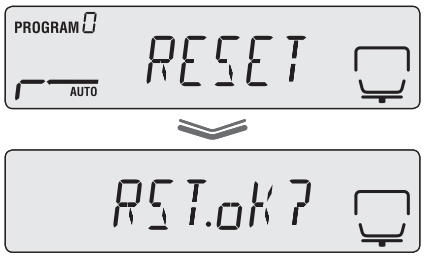
MENU [PRoGRM]

The menu opens.



2 Select the RESET option from the menu.

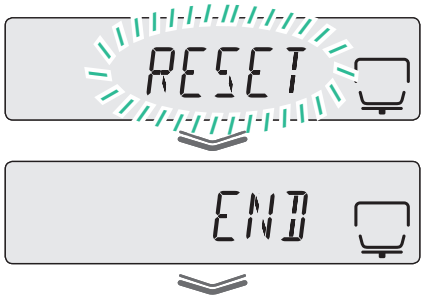
▲ ▼ [RESET] → ENTER [RST.oK?]



3 Start the initialization.

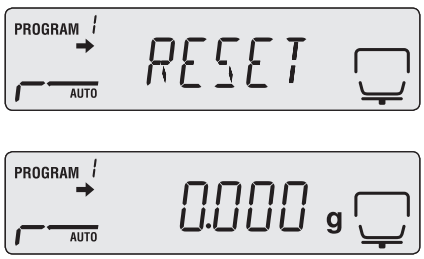
ENTER → [END] → [RESET]

The setting memory inside the moisture analyzer will be initialized. The calibration weight setting values for span calibration cannot be initialized by the menu rest process.



4 Return to the standby state.

Press ESC to return to the standby state (measurement display) where measurement can be performed.



Inspection

Because the moisture analyzer may have an error due to its application and operating conditions, the customer needs to routinely and periodically check if the moisture analyzer maintains the required performance and functions normally.

The customer should determine the actual inspection (including the inspection method and criteria) as the control criteria depend on the purpose of application and management of the moisture analyzer.

If the requirement level of inspection is low, some problems may not be found. However, if this level is too high, the application efficiency may drop. You should determine the well-balanced inspection level by considering the risk of overlooking detection of a problem and the required measurement performance.

The following provides a guideline for carrying out routine and periodic inspections.

Use this guideline as a reference when carrying out actual inspections.

Routine Inspection

The operator (or manager) needs to routinely check the moisture analyzer.
You can determine the minimum number of points to check.

The following gives examples.

	Routine inspection (Example 1)	Routine inspection (Example 2)
Frequency	Once a day	Once or several times (any) a day
Inspection time	Before starting the measurement	Before starting measurement and before important measurement
Method	Check for an instrumental error at a single point.	Check for an instrumental error at a single point.
	Determine a single observation point which is a little higher than the upper limit of actual measurement range.	As the inspection point before measurement, determine a single observation point which is a little higher than the upper limit of the entire possible range in actual measurement. As the inspection point before conducting an important measurement, determine an observation point that is slightly larger than the mass of the sample (object) to be actually measured.
Criteria	The value actually measured by the moisture analyzer, and it shall be within ±5 of an additional decimal place added to the required level of accuracy.	The value actually measured by the moisture analyzer, and it shall be within ± 5 of an additional decimal place added to the required level of accuracy.

▽ Continued on next page

▽ Inspection

What is an instrumental error?

This is a difference between the actual value and the value indicated by the moisture analyzer. A weight equivalent to the observation point is measured by the moisture analyzer, and a difference between the measured value and the weight is evaluated.

Periodic Inspection

Periodic inspection is a regular inspection to be carried out periodically (for example, once a year).
The periodic inspection should cover the general measurement items such as performance and functions of the moisture analyzer.
The calibration certificate showing the JCSS logo for uncertainty can be issued (for the moisture analyzer only).
We recommend that you consult our authorized service agency for actual inspection.
For further information, refer to our Web site (http://www.shimadzu.com/products/balance/index.html).

The following outlines the periodic inspection.

	Outline of periodic inspection (Example)	
Frequency	Once a year	
Inspection time	Any day	
Method	Check the appearance and functions of the following parts for abnormalities: • Display panel • Keyboard • Sample pan • Level gauge Check the following performance.	
	Reproducibility	Repeat to measure a weight, which is approximately half of the weighing capacity of the moisture analyzer, for five to 10 times and evaluate these values.
	Balance error due to displacement	Place a weight, which is approximately one fourth to one third of the weighing capacity of the moisture analyzer, at the center of the pan and at the position displaced for the specific amount and evaluate the difference in their measurements.
	Instrumental error	Select three to five observation points, and evaluate a difference between the actual weight and the value measured by the moisture analyzer at these points.
	Temperature	Calibrate the temperature using the optional temperature calibration kit.
Criteria	Weight	When the actual value measured by the moisture analyzer is under 50 g, the accuracy should be ± 5 mg, when it is over 50 g, the accuracy should be ± 10 mg.
	Temperature	During temperature calibration: Temperature on the pan should be within ± 5°C if the set temperature is 100°C. Temperature on the pan should be within ± 5°C if the set temperature is 180°C.

MEMO

Troubleshooting Guide

If You Have a Problem.

If the MOC63u moisture analyzer does not operate normally, check the following points:

Phenomenon	Possible cause	Actions taken	See
Nothing appears on the display.	● The power cord is unplugged. ● The switchboard is turned off. ● The source voltage is incorrect. ● The power fuse may be blown or dismounted.	● Check the power supply and source voltage, and connect the power cord correctly. ● Mount the fuse correctly.	
The display does not change even when a sample (object) is placed on the pan.	● The sample pan or its supporter may have become dismounted.	● Mount the sample pan correctly.	Page 35
The display is unstable. ➡ (No stability mark appears.)	● The moisture analyzer is unstable on the table. ● The pan or the sample may have come in contact with the windbreak or heater cover.	● Keep the moisture analyzer way from vibration, wind and other disturbance. ● Place the moisture analyzer on a stable desk.	Page 32
The measurement result is incorrect.	● Span calibration has not been performed.	● Perform span calibration.	Page 40
	● Zero is not shown before measurement.	● Clear the display by pressing →0/T←, and start measurement.	Page 45
Desired measurement unit is not shown.	● The desired measurement unit has not yet been set.	● Set the desired measurement unit to be displayed.	Page 63
The Windows Direct Function does not start.	For further information, see "If the Windows Direct Function does not work well".		Page 84
If you forget your password	● Contact the service representative.		
The heater does not light up.	● The heater cover may be open. ● The heater may be turned off. ● The power cable of the heater may be unplugged.	● Close the heater cover.	Page 46

When These Messages Appear…

When any of the following messages appears on the panel, take actions given.

Message code	Possible cause	Actions taken	See
ABoRT (Operation aborted)	● Span calibration or measurement was aborted.	● Press ESC to return to the standby state.	Page 48
CoM.ERR (Command error)	● An unrecognizable command code was received.	● The error code appears and the moisture analyzer enters the error state. Issue the correct command code.	Page 89
ERR.001 ERR.002 (Hardware error)	● The temperature sensor has failed. ● The hardware information is incorrect.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	
ERR.005 (Memory error)	● Memory has failed.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	
ERR.100	● The heater cover was left open for more than one minute during measurement.	● Stop the measurement by pressing ESC.	Page 48
ERR.101 ERR.102	● The heater temperature sensor has failed.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	
ERR.110	● The heater lit is not closed.	● Press ESC and close the heater cover correctly.	Page 46
ERR.121 ERR.122 ERR.123 (Heater failure)	● The heater cover or the heater has failed.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	
ERR.124	● The ΔM value is not reached four hours after measurement.	● Recheck the ΔM value or the set temperature.	Page 46
ERR.200	● The power supply has failed.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	Page 38
ERR.201	● The frequency judgment is abnormal.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	Page 38

▽ Continued on next page

▽ Troubleshooting Guide

Message code	Possible cause	Actions taken	See
ERR.202	● The source voltage is abnormal.	● Unplug the power cord, and then plug it in again. If the same message appears again, call a service representative.	Page 38
ERR.C01 ERR.C02 ERR.C04 (Span Calibration error)	● A large error in the zero point or the sensitivity of the pan. ● A tare remains on the pan. ● The sample pan is not mounted correctly. ● Incorrect weight is placed on the pan.	● Press ESC to return to the standby state. Place the correct weight at the center of the sample pan.	Page 40
ERR.oL ERR.-oL	● The oL/-oL status was entered into during measurement.	● Check the sample pan.	Page 35
oL -oL (Overloading)	● Too may samples have been placed. ● The sample pan is not mounted correctly.	● Mount the sample pan correctly.	Page 35
TIM.oUT	● You started measurement more than thirty minutes after the zero point had been adjusted.	● Stop the measurement by pressing ESC.	Page 45

Specifications (main unit)

Measurement format	Evaporation weight loss method (Heat drying and weight loss method)	
Sample weight	0.02-60 g	
Minimum display	Weight	0.001 g
	Moisture content	0.01 %
External weight range for span calibration	10-60g	
Measurable quantities	Moisture content (Wet Base and Dry Base), weight, solid content	
Repeatability (Standard deviation) *1	Sample weight: 2 g	0.15 %
	Sample weight: 5 g	0.05 %
	Sample weight: 10 g	0.02 %
Measurement modes	Standard drying automatic ending mode	—
	Standard drying timed ending mode	One to 240 minutes of measurement, or 12 hours of maximum continuous measurement
	Rapid drying mode	Automatic or timed ending mode is selectable.
	Slow drying mode	Automatic or timed ending mode is selectable.
	Stepped drying mode	Automatic or timed ending mode is selectable.
Heater temperature range	50 °C to 200 °C (in 1 °C increments) *2	
Display	Backlit LCD display (120 × 30 mm)	
External output	RS-232C interface	
	Data I/O interface	
	USB interface	
Communications	Allows for data output using Windows Direct function.	
Storage of measurement conditions	Allows for storage of 10 sets of measurement conditions.	
Data memory	Allows for storage of 100 pieces of data. *3	
Temperature/humidity operating range	5 °C to 40 °C, maximum of 85 % RH	
Heat source	Method	Halogen (straight tube)
	Power consumption	Rating 400W
Power supply	AC 100 - 120 V, AC 220 - 240 V 50/60 Hz	
Voltage fluctuations	Within ±10 %	
Interrupting rating of fuse	35A (Fuse 240 V), 63A (Fuse 120 V)	
Power consumption	Rating 430 VA	
Pollution Degree	2	
Overvoltage Category	Category II	
Altitude	Up to 2000 m	
Installation Site	device may only be used indoors	
External dimensions	Approx. 202 (W) × 336 (D) × 157 (H) mm	
Weight	Approx. 4.2 kg	

*1 The repeatability (standard deviation) is shown for the standard measurement (when disodium tartrate dihydrate is sampled). Measurement of other types of samples under various environments and measuring conditions is not guaranteed.

*2 The temperature on the pan is shown.

*3 Measurement date/time, measurement conditions, weight before and after drying, sample codes, measurement results, etc.

▽ Continued on next page

▽ When Required

Accessories

The part numbers and specifications given are subject to change without notice.

◆ Standard Accessories and Consumables List

Item	Part number	Description
Pan supporter	321-71598	
Heater insulation plate	321-71736-01	
Windbreak	321-71720	
Power cable 240V (*1)	071-60825-51	2.4 meters long (RoHS), 250 V/10 A
Fuse 240V	072-02004-21	3.15 A/250 V
Halogen Heater 240V	321-71534-02	
Power cable 120V (*1)	071-60816-12	2.5 meters long, AC125 V/10 A
Fuse 120V	072-02004-24	6.3 A/250 V
Halogen Heater 120V	321-71534-01	
Main glass	321-71450-01	Size 108×122 mm
Front glass	321-71451-01	Size 34.5×149 mm
Cushion rubber	321-71573	
Plate for Temprature calibration kit	321-71521-01	

*1 The attached power cable, which is specified in the user's manual, may be substituted for a cable that meets the regulation of each country.

◆ Optional accessories list

Item	Part number	Part number for RoHS	Description
Printer EP-80	321-62675-01 (w/o AC adapter)	321-80016-01 (w/o AC adapter)	
Printer EP-90	321-62675-11 (w/o AC adapter)	321-80016-11 (w/o AC adapter)	
Display protect cover (five sheets)	321-71512-10		
Aluminum pan (disposal)	321-71571-10		Aluminum t=0.1 disposable pans, One package (50 sheets)
Fiberglass sheets	321-71731		For measuring liquid sample. One package (100 sheets)
Temperature calibration kit	321-71520-01		
Sample pan (SUS)	321-71572-10		Stainless steel t=0.3 (5 sheets)
Sample pan	321-71572-11		Aluminum t=0.3 (5 sheets)
RS-232C cable	321-61967		D-sub9P (lenghth:1.5m) for DOS/V
USB cable set	321-71730-41		2 meters long, attached CD-ROM for USB driver
Sample pan handler	321-71623-01		Stainless steel

Menu Map

The Menu Map illustrates the menu system in an easy to understand form.
You can access the desired menu item quickly.
For further information on menu display and operations, see "Menu" (☞ page 42).

◆ How to use the menu map

Notation of menu map	Explanation of operation
▲ ▼	Select a menu item by pressing ▲ or ▼.
▶	Press ▶ to move to the next menu item.
◀	Press ◀ to return to the previous menu item. You can return to the standby state by pressing this button on the first layer of the menu.
ENTER	Applies the setting.
ESC	You can return to the standby state by pressing ESC during menu display.
☞	Refer to the specified page of the Instruction Manual.
◆	Indicates the restriction of menu item selection.
*	Indicates the factory default (to be set during menu reset).

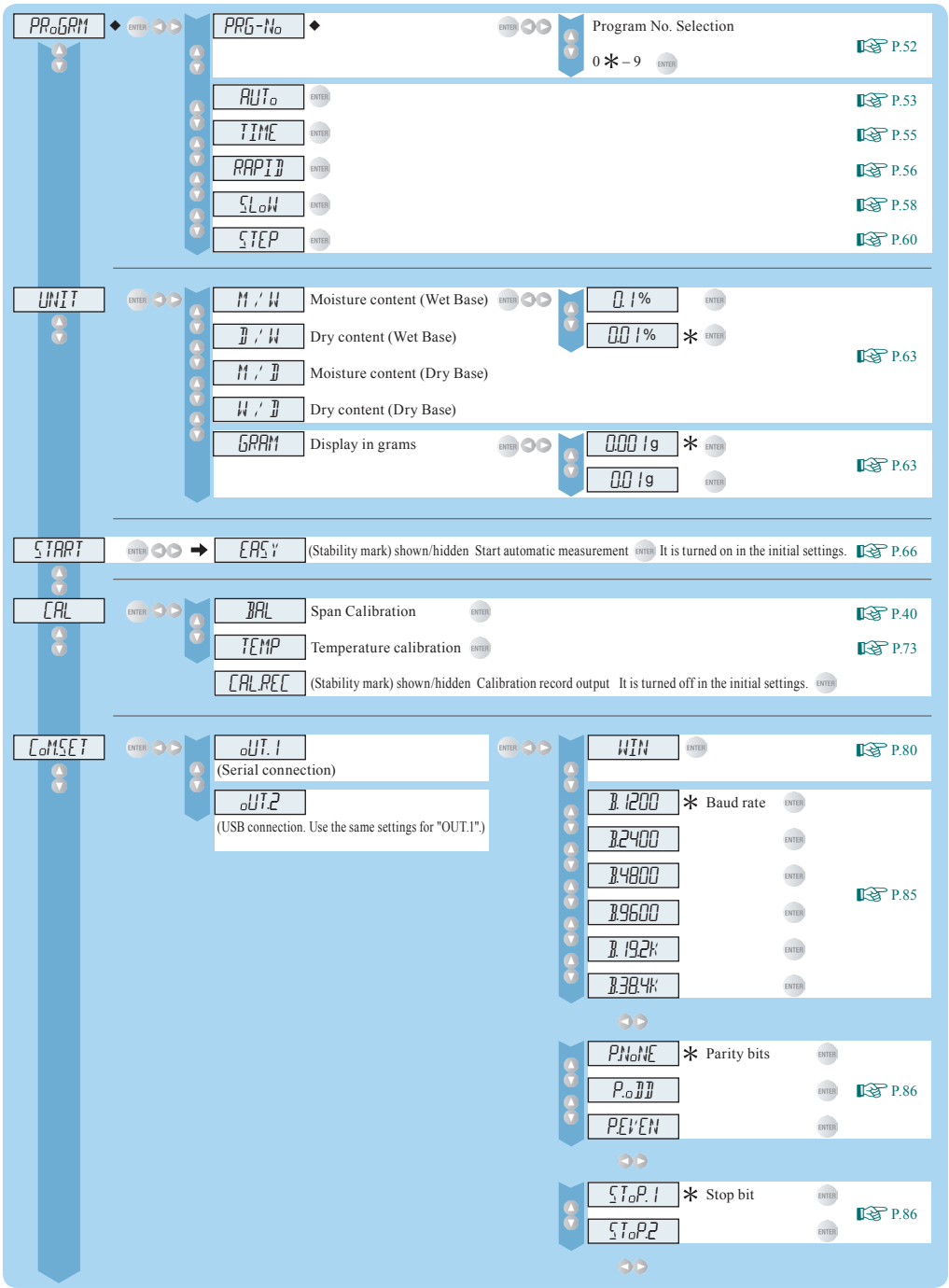
▽ Continued on next page

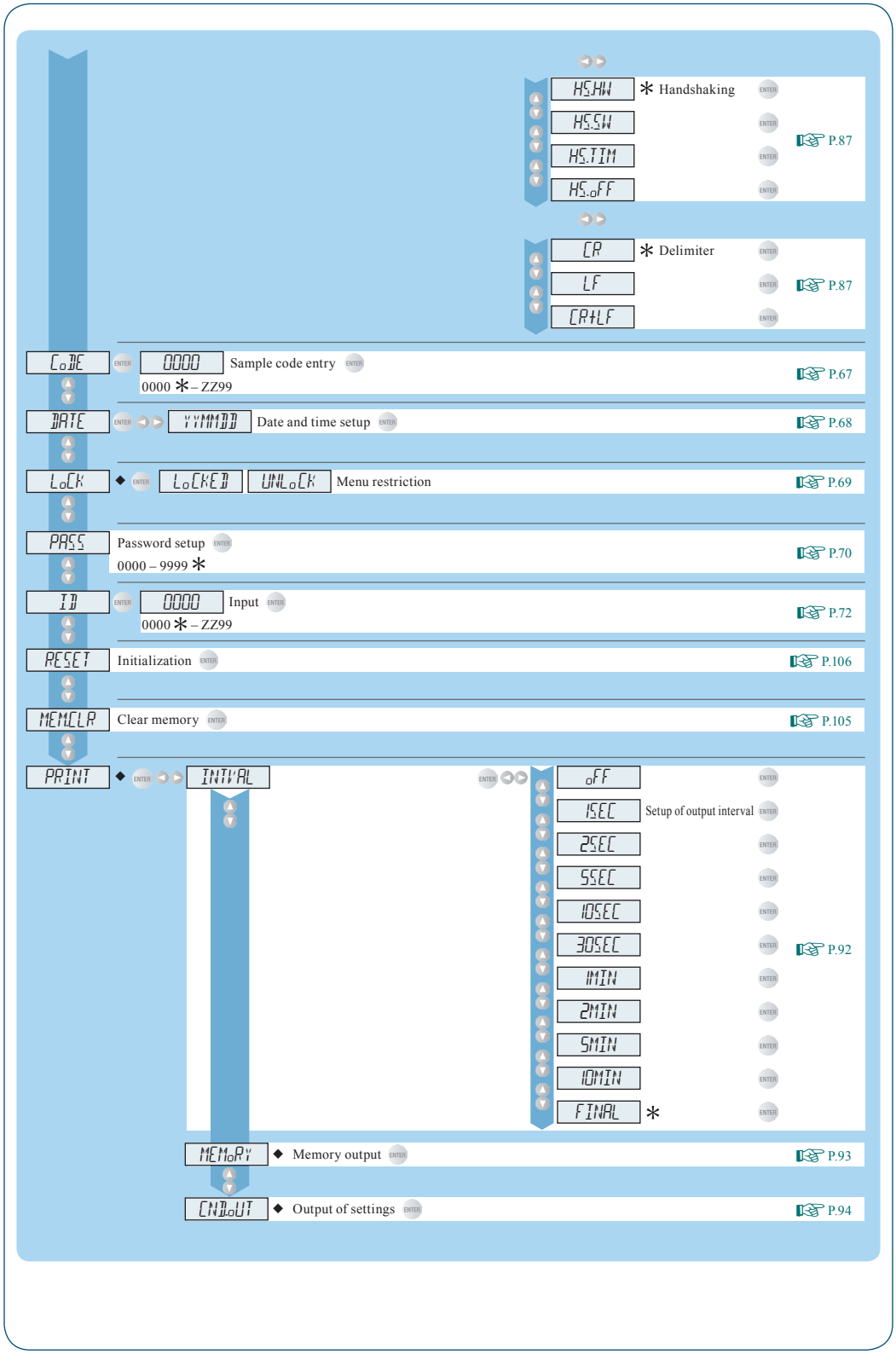
▽ When Required

◆ Menu map

Press MENU in the standby state.

∗ Defaults ◆ Items displayed during menu restriction




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